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AUGUST 1912


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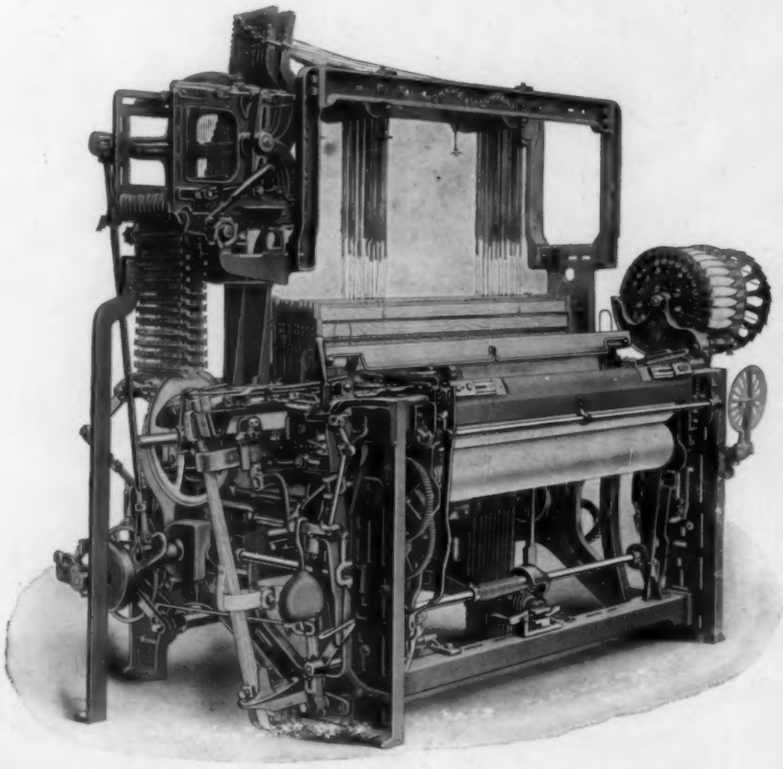

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# COTTON

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## FIXING THE PRICE OF COTTON.

It does seem too bad that in a whole country full of trusts, it is almost impossible to organize a gigantic cotton trust for the benevolent purpose of assuring the cotton grower 15 cents a pound for his product. It must not be understood that efforts have not been made in the past in this direction and in fact efforts are still being made to accomplish this philanthropical object. P. C. Wadsworth, treasurer of the Cotton Growers Co-operative Society of Atlanta has a plan which proposes to pay the cotton grower three quarters of the 15 cent rate in cash and the remainder in 7 per cent debenture 20 year bonds. Mr. Wadsworth has recently been to Washington and presented his plan to various members of Congress from the South. It was reported that some of the Southern representatives expressed themselves as in sympathy with the scheme, while others stated that the capital required for the plan would be too large, as it would need at least $250,000,000 to finance the proposition and when all the stock was subscribed it would practically be "a great cotton trust."

Mr. Wadsworth, however, is not alone in his philanthropical endeavor to help the cotton growers. George Dole Wadley, of Macon, Ga., is the president of the Southern States Cotton Corporation. This corporation also plans to pay the cotton grower a percentage of the price of 15 cents in cash and the balance in notes or bonds to be taken up by the company pro rata as the cotton in storage is disposed of. Probably at the suggestion of the corporation interests, Governor Brown, of Georgia, called a meeting of 17 governors to meet at Atlanta on July 12th for the purpose of discussing this proposition. Unfortunately there was not a governor present, even Governor Brown himself being unable to attend. There were however, some seven governors represented by proxy. A committee appointed by Mr. Wadley or his able assistant, the permanent chairman of the convention, drew up a set of resolutions indorsing the plan of the association.

One very interesting feature of the meeting was the distribution of a little pamphlet entitled "Cost of Producing Cotton from 1901 to 1911 in each Cotton Growing State in the South." From one of the tables shown in this pamphlet, every cotton growing state in the South with the exception of North Carolina has lost money on its cotton crop for the past ten years. In fact the total loss for ten years in the eight states exclusive of North Carolina amounted to $1,980,302. This loss however is not merely indicated by the two million dollars in round numbers shown in the figures ,as a note underneath the table indicates that only millions are used, all naughts being left off, therefore six naughts should be added to this total loss in order to indicate what the Southern cotton grower has really put into the ground and not again recovered from it. It is passing strange where they get so much money to bury in the ground for the benefit of other people. One would immagine that after such a loss as this, instead of financing cotton corporations they would quit growing the staple entirely.

## JAPANESE COTTON MANUFACTURING.

The white races seem almost too secure in their commercial supremacy and it is no fiction to predict that the time may come, and more quickly than we now think, when the Mongolian, with his marvelous powers of imitation may even equal the caucasian despite the much vaunted initiative of the latter. In no one item is this fact more noticeable at the present time than in the comparative growth of the cotton manufacturing business in Japan. To this race, machine made textiles are of recent acquirement and the rapidity with which they have accepted and utilized English and American machinery and the aptitude which the tiny Japanese child as well as the scarcely less diminutive Japanese adult has adapted himself to the manufacturing of cotton piece goods, knit goods and all forms of textile manufacturing is almost incredible. The truth of this is clearly shown, however, by the extent of the work of the Kanegafuchi Cotton Spinning Company of Tokyo which boasts seventeen factories situated in many different cities and representing an aggregate of some 300,000 spindles with as many as 3,500 operatives.

While the output from this single chain of factories is not yet so large as to be an actual menace to importation from America and from Europe, yet it must comprise the germ of a condition which is destined to develop into an element which must be recognized in a country heretofore almost without large industrial enterprises. Even now, for the lower counts of yarn, or approximately up to 20s, the Japanese mills practically control their own and the Chinese markets against the competition of England and India. In the year ended June 30th 1911 for example, the cotton yarns exported from Japan aggregated 116,244,000 pounds and the cotton cloth exports over the same period was 107,000,000 yards.

Japan has one advantage which no other country save China can quite meet and that is in furnishing a class of labor which is intelligent, abundant and willing to be paid but poorly, according to western standards. Such average daily wages are paid as amount in United States money to 22 cents a day for men, 14 cents for women and 6 to 8 cents for children. It has been urged that this class of labor will not result in the best grade of manufactured articles, especially of textiles, but here again Japan is improving original conditions and with such rapidity that America, and Europe might well take pattern therefrom.

The Japanese recognize the full value of the operative to the industry and with this recognition has come some provisions of the most advanced kind for the worker. The Kanegafuchi Company is doing some advanced welfare work, and the cleanliness of the plants working rooms, the improved health of the operatives and the correspondingly improved character of the work is growing more and more marked each year.

Japan has also quite recently made demand for adequate labor regulation and the working hours appointed for women and children in factories, while still longer than ours, are much improved over what was originally permitted to the hand laborer in the small shops and factories of the old *regime*. Already the country has a compulsory education law and about 98 per cent of the children between 6 and 14 years are in school, the age limit for the mills being 13 years and it is believed that this law will be made even more stringent with the next Imperial Diet.

The Kanegafuchi Factory has instituted many improvements all designed for the benefit of the employee and their efforts in this direction have met with the co-operation and appreciation of those for whom they were planned. Most of the operatives in the mills of this company are women and each one pays three per cent of the wages received into a common fund for an employees pension, the Company paying an equal amount into this fund. Each family of an employee who dies or an operative who is ill or injured receives a certain amount as pension, but if the illness or disability of the employee extends over a period of more than ten years the pension is paid from another fund designed for this sole purpose. The amount of this pension fund is estimated at $143,000 while in addition there are several other fixed amounts for the benefit of employees, these amounts all being paid by the company. Among these may be mentioned $30,000 called the "operatives sanitary fund," $112,000 as a fund designed to promote the welfare of operatives in a domestic and educational way, and a fund of about $15,000 devoted to erecting an operative's sanitorium. The company also conducts a savings deposits department which pays the operative interest on long time deposits. In addition to these provisions there is a theatre and dance hall provided for mill employees at Tokyo and five physicians are regularly employed by the company to care for the health of the operatives.

Labor hours are long, being ten hours daily but the Kanegfuchi Company has only six working days a week although it is generally customary in Japan to have only two rest days a month, and also to work eleven hours daily. This company, too, has instituted half hour rests during the day which they declare much increases the working power of the employee.

The total number of operators in Japanese mills in August 1911, was approximately 92,000. This figure however, does not include the operatives working at home on hand looms. Hand weaving being followed as a trade in Japan in over 400,000 dwellings or small establishment according to official reports and about four-fifths of this weaving is on cotton goods. The extent to which this hand weaving is carried on, two or more looms being common in these dwellings, demonstrates even more forcibly than mill statistics the growing importance of the cotton manufacturing industry of Japan.

While Japan has often been deemed below Caucasian countries in the social, religious and moral scale of estimates, yet the rules in actual force in the Kanegfuchi Company might well be followed by many factories in other parts of the world. Students of political economy declare that the first step toward commercial importance and final commercial supremacy is indicated by a recognition of the needs of the employee and if this is true then Japan is already a long way on the road toward the much desired goal, and a probable competitor in the textile manufacturing field.

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The ninety-third meeting of The National Association of Cotton Manufacturers is to be held at The Griswold, Eastern Point, New London, Connecticut, beginning on the evening of September 9, 1912, and continuing through the two following days.

The delightful scenery of this location and the attractions of the house are such that an attendance of over 400 is expected.

## COTTON MANUFACTURING IN THE SOUTH.

Editorial utterances in a Southern publication tending to show the virility and progressiveness of Southern textile manufacturing interests are often met with uplifted eyebrows and a bored expression plainly indicative of the fact that the reader is mentally applying the colloquial attribute "booster" to the writer thereof. It is therefore interesting to note the attitude of a textile paper published in the heart of the textile industry of New England, the city of Boston, and we therefore reproduce the following editorial from a recent issue of *The American Wool and Cotton Reporter*:

"For years past there has been a good deal of uncertainty regarding the future position which the South was to hold in the making of cotton fabrics. Some men in the trade contended, and do still, that there never could be a development beyond a certain point, while others have been just as positive that a much greater improvement was possible than any which had been noted up to that time. Without any question it can be stated as a fact that many of the Southern mills have labored under far from ideal conditions of manufacturing and selling, and conditions which would have kept from Northern mills quite a large share of their past prosperity.

"All references to future possibilities must be considered from different standpoints, and many have believed the limit of development was about reached through comparing a certain few facts on the subject. Quite a few years ago there was a scare among Northern mills that the South was going to take away much of the manufacture of plainer cloths. Immediately some of the poorer equipped mills began to discard some of the old machinery and replace with that more up-to-date, so as to lower the cost of production.

"Naturally this policy of improving the machinery tended to keep the business in the North, but it did not stop the development of Southern manufacture, which has continued to grow with enormous strides, and today men are forced to admit that predictions made at that time were based on correct assumptions. Even the fact that many of the Southern mills were of small size as compared with those in the North has not seemed to affect the situation to any great extent. It is now realized that with the building of larger mills, and better financial policies there is more possibility than ever before that much of the manufacturing will be transferred to the South, in fact, quite a little has been, and of late these mills have been busy, while Northern mills were short of orders, although this fact is partly true because the demand has been for coarse cloths. It must not be forgotten that there is still much coarse yarn and many coarse fabrics made in the North, and not all the orders taken are for fine or fancy material. Two other facts have retarded the growth in the South, and these are the lack of finishing works in proximity to the manufacturing plants, as is noted in the Northern states, and probably more than anything else, there has been a great lack of skilled men in the responsible positions of manufacturing.

"That there has been so much improvement shows that there are fundamental conditions now existing which tend toward economy of production. Whether such conditions will continue to exist cannot be foretold, but that they do exist is unquestionable, and some sellers have been forced to admit the situation. The profits now being made by Southern mills are quite large, and will, without doubt, place many mills in comfortable positions in regard to their surplus accounts, and with satisfactory financial policies, it is expected that a good start toward greater development will be possible.

"This development will not only cut into more of the coarse cloth making of the North, but also into some of the sales of fine and fancy fabrics. Recently there has been a large tendency to vary styles through slight changes in the patterns, even in print cloth constructions, and this has been of large educational value to Southern mill men. It has made them interested in the securing of additional profits, and has helped the situation in other ways. Certain Southern mills have been and are making lines of fine and fancy cloth, and that they are competing largely for business can be proven by conversing with men who understand the situation, and not only are they going after the sales, but they are getting them. It is admitted that much of the cloth of this character is as good as most Northern mills are producing, and the cloth is being made at a lower price. This statement does not mean that the cloth is always sold for a lower price, for it is a policy in cloth selling, as it is in selling other articles, to obtain as high a price as market conditions warrant.

"The statement that costs are lower may be questioned by some, but it is a fact, nevertheless, for by comparing some mills in which size favors the North and which make similar lines of material, the cost of weaving and expense accounts were less per loom, naturally giving a lower cost of production. Such a statement does not prove that there are not mills in the North which have lower producing costs than mills in the South, but it shows that certain Northern mills are in a fair way to lose a portion of the orders they now receive on fancy lines, unless they can reduce their operating expenses in some manner.

"That there can be no large general reductions in the wages in the North has been abundantly proven during the last six months, and any saving of importance must be made through a better system of organization or else in the expense account. Probably this can be done to an extent, but not to a large enough degree to affect the results, for many Northern mills being of much older date are not arranged so well, and they contain, in certain instances, machinery which should be on the scrap heap. Only through extreme care can certain mills continue in operation, except when the demand for cloth is abnormal, and prices show more than the usual profit. One thing which will force this development can be deduced from the statement that buyers are obtaining more knowledge regarding cloth quality and price, and will buy their fabrics where they can obtain the best value for the price paid. In times past this has not always been true, for buyers ordered their cloths from certain sellers, not realizing that others were delivering more value at the same prices.

"With the larger amount of experience in mill management and the longer experience of the operatives, it would appear as if Northern mills would make up in one direction what they lost in another, but this does not seem true except in certain instances, and on certain lines of cloth.

"The large production of high-class novelty fabrics in the North, such as those containing silk in some form, and with very fancy weaves, are probably as much a result of competition from the Southern mills as they are from any desire to offer new fabrics. Of course, larger profits are

secured from the making of better fabrics which will sell well, but it is true that some of the fancy fabrics which were formerly produced in the North are now being made successfully in the South, and competition has undoubtedly made prices lower. There is a general tendency in cloth making, which compels the fancy mills to make still fancier cloth, and compels even some of the plain mills to sell fabrics which would have been called fancy only a few years ago.

"The South has become pretty well established as a large producer of plain fabrics, both in coarse, medium, and some fine grades, but it would be well to place emphasis on the fact that recent developments are making it a large producer of colored fabrics of various qualities, and also of fancy lines, which are taking business which might have been secured by Northern mills were lower producing costs possible. Of course a portion of the demand for better and fancier fabrics comes naturally through a growth in desire for improved fabrics, and it may be that Southern mills are supplying this growth, starting with the plainer cloths, but there are an increasing number of men of experience who state that orders are being obtained in the open market in competition with Northern mills at a reduction in price, and that the orders being taken show a much larger ratio of increase than would be expected from the added demand for fancy cloths. The South may well feel proud of the progress made in the comparatively short time in which her manufacturing industries have been developing, and unless all signs fail, it will only be a short time before a larger number of Northern mills feel the effects of competition on fancy cloths, as they already have in the making of many plain lines."

## A PLEA FOR A PROTECTIVE TARIFF.

*(Contributed to* COTTON.)

BY GEORGE F. HOFFMAN, HOFFMAN-CORR MFG. CO., PHILADELPHIA.

The time has arrived when every man should think right and vote right. The people of this country are facing one of the most serious times in the history of our land. The agitation that is going on, if it continues, will force more people out of employment than ever before in the history of the country. This country is 125 years old, and there never has been a time when a willing worker could not get employment, except when free trade and tariff agitators were rampant. Possibly this country with its advantages and thrifty people could have thrived on low tariff and free trade had they started that way. But the country was not started that way; it was built up on the lines of protection, and if the bars are now let down and this market is opened to the world it means reorganization; it means that the American workman must compete with foreign labor. He must work the same amount of hours a day and receive less compensation. Today the American workman is receiving more compensation and working less hours. However, it doesn't stop there; take Germany, for instance, she sends millions of dollars' worth of goods to this country today, and with the duty reduced she can send many millions more. But no American goods could be sent to Germany, because they have a protective tariff. Germany would send more goods here if the tariff were sufficiently lower, except for the fact that our workmen would be out of employment and have no money with which to buy.

Probably there is no better government on the face of the globe than the German government. There is not a man, woman or child over eight years of age who cannot read and write, and most of them two languages; and it is to be regretted that these conditions do not exist throughout America. The German government has a tariff commission that has the power to regulate the tariff. It is not put in the hands of a lot of inexperienced people, it is operated by capable business men. When there is a big crop in wheat they raise the duty so none can be imported; when there is a short crop of wheat they lower the duty so that it can be imported. In fact, the whole tariff proposition is run so as to properly meet conditions as they arise, always protecting Germany.

England buys most of her cotton from America, yet the American manufacturer cannot compete with her today. England sends more cotton goods to Cuba than we do, although we have a preferential duty, but the English can undersell us. It is again a question of labor and wages.

There is no doubt but that there are some things in the tariff that should be corrected, but it should be gone at in a sane way. If a man had a bad tooth that gave him trouble and he went to a dentist and asked him to pull out every tooth that he had in his head he would be considered insane; it is about parallel with going through the list and reducing everything without considering the consequences.

What this country needs in Washington are statesmen, not politicians. It is impossible to win a race with a cart horse; to have any show at all he must be a race horse. If the people expect to have business and prosperity they must select thinking representatives whose policy will be to build up and protect. It would be far better to encourage waterways, good roads and develop the country rather than suggest legislation of the kind that was tried long ago and found to create nothing but hardship and misery. However, if there is any change to be made, have it prohibit gambling in the necessaries of life, such as wheat, cotton, etc. There are over 30,000,000 acres planted in cotton, and there is more cotton sold than could be raised on 300,000,000 acres; yet a bale of cotton cannot be bought to grade on the exchange. Now, here is a chance for a real reform, and, no doubt, there are more opportunities, but let the reforms be sanely executed.

A business man cares nothing for party; it is policy that he appreciates. If the Democratic party had a policy that would build up, there is not a manufacturer in the country who at heart would not be for it, but so far the Democratic party policy has not been one of building up; it has been one of tearing down. The country today should be at the height of prosperity. Its hundred millions of people and excellent crop conditions should give us nothing but prosperity, but on account of continual political agitation and upheavel a lack of confidence has been created. Merchants will not buy, and manufacturers dare not go ahead and produce for fear they will be asked to compete with goods made in foreign markets which cost less money to produce. It is a business proposition, and to sell the goods they naturally will have to meet competition and they want to know what that competition is going to be. It seems so unjust to ask American manufacturers and American workmen to compete with foreign labor. I remember quite distinctly hearing a business man say he was going to vote for Bryan, but he hoped Taft would be elected; he thought right but voted wrong. Now, it behooves every voter to think right.

We hear all kind of arguments, but the very sinew of our government is labor, and for the prosperity of the land it must be protected. We hear how cheap this or that would be if the tariff were different; that might be true, but it would not stop where it started—wages could be compelled to get in line. I heard a fellow argue that when the street car fares were reduced to 5 cents from 6 cents it was against the interests of the poor man; for, he argued, when the poor man now walked he saved only 5 cents, whereas before he saved 6 cents. So, it is not so difficult to get an argument for most anything, but facts are what we should deal with now, not theories. And it must be borne in mind that no matter what kind of a job a man has here, the fellow on the other side gets less money for the same work, and, despite the claim that a dollar goes so much further over there, he is a poorer man. These are facts and not theories.

I contend that President Taft by vetoing the bill to reduce the duty on cotton goods did more to encourage the industry than the Representatives did who voted for it. By their act, and acts speak louder than words, they demonstrated that they felt cotton manufacturers were overprotected, although those who voted for that policy, had it gone through, would have received just what they deserved. I suppose these Representatives felt they were elected on the platform of tariff reduction and it was their duty to stand by that policy.

The story is told of a funeral, that while the mourners were on the way to the grave and the carriage in which the pallbearers were in was going over fields and fences, one of the pallbearers said, "I believe our horses are running away." He stuck his head out of the window and called to the driver and asked him if they were running away, and the driver replied that they were not, but that the horses attached to the hearse were running away, and it was customary for the pallbearers to follow the hearse and that is what he intended to do. It seems this is what many Representatives tried to exemplify. They were elected to reduce the tariff and they proposed to do it, regardless of the consequences, although they were requested by the very men who voted for them not to do this. When they were elected the voters doubtless intended a low tariff for the other fellow; it seems to be human nature to think that the best place for a carbuncle is on the other fellow's neck.

Congressman J. Hampton Moore had the courage to stand in the halls of Congress and plead for the cotton manufacturers, and every cotton operator in this country owes him a vote of thanks; if there is an unpardonable sin it is ingratitude. The time has arrived when the cards should be thrown on the table and every man who wants protection should vote for it, and every manufacturer and every working man should remember the Wilson Bill.

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One of the commercial agents of the Department of Commerce and Labor reports that a firm in the Levant desires to get in connection with American manufacturers of underwear and hosiery. There is a large demand for hosiery which can be retailed at 15 to 25 cents per pair, and this firm is prepared to do a large business in the lines mentioned. The same firm would also be pleased to hear from manufacturers of gray sheetings and drills of 36 inches width and 3 yards per pound and of ginghams. For further information apply to the Bureau of Manufacturers, Washington, D. C., and refer to File No. 8850.

## WHAT IS ELECTRICITY?*

BY JNO. S. BLEECKER,
GENERAL MANAGER, COLUMBUS POWER CO.

Some years ago when I was instructing motormen in the art of operating street cars, I thought it would be a good plan to prepare a set of questions as a sort of examination for them to pass before approving their instruction as complete, and at the top of the list I put a test question, believing that the kind of an answer I got to this question would indicate the kind of a man I was dealing with. The question was "what is electricity?" I received many and different answers, displaying originality and inventive genius. Sometimes a man would be frightened by the first question and fall down on the entire list. Such a man I knew was not the proper material for facing emergencies which arose on the front end of a street car. Other men would become discouraged because they did not know just how to answer the question and some would give interesting and illuminating answers. One said that "electricity was a kilowatt, and that a kilowatt was a little green bug." Another, "electricity is hot stuff." There is one answer that I did not get but which I believe is the best answer of all, and that is, *"electricity is efficiency."*

There has been much talk recently of efficiency engineering, and as you all know the theory on which this art is based is that each of the various and sundry conditions entering into any problem of manufacture shall be given individually the amount of importance which attaches to it, and no one item shall be permitted to dominate the whole problem to its detriment. On this theory, and according to this practice, the word "efficiency" becomes synonymous with "electricity," as applied to the operation of a cotton mill.

There is absolutely nothing that I can say to cotton mill men which will throw any light on the subject of efficiency as applied to their textile operations. This feature has been given so many years of careful study by the ablest minds in the world that it would be very presumptous on my part to suggest that efficiency in the textile direction had not been carried to its highest perfection. When, however, it comes to the question of drive or the furnishing of power for the carrying on of textile operations, we get into a slightly different field, and one which has even yet not been thoroughly explored.

In this field there are differences of opinion, and there are differences in methods and results, but on the assumption, which is admitted by all, that best results can be secured from cotton machinery and cotton mill operatives by uniformity and precision, there can be no difference of opinion concerning the results to be expected and obtained from the electric drive.

Let us look at the real results which the cotton mill man wishes to achieve in his manufacturing process, leaving out of consideration the very important questions of buying cotton and selling goods. The manufacturing end of his business depends for its success on the most efficient use of his investment in mill and machinery, and while the problem of power with which to drive the machinery is to the mill man like measles to the child—very annoying, he

*Read before the Cotton Manufacturers' Association of Georgia.

still must have it—and that kind which produces efficient results is the kind which he should have.

The efficient use of the investment depends upon two factors—human and mechanical.

The efficiency of the human help in a cotton mill is increased when electric drive is adopted by eliminating many manual operations and substituting machinery or equipment therefor—such as the elimination of constant repair and adjustment required by elaborate belting and substitution therefor of electrical wires, definitely fixed in position and requiring no attention. The elimination of manual labor for inspection and oiling required by shafting.

Not only is the human attention to the shafts and belts themselves eliminated, but the idleness on the part of many operatives caused by a single interruption in a main drive is eliminated.

The electric drive improves manual efficiency by permitting an arrangement of machinery which can be most accessible to the operator, and which secures to him the greatest ease of operation, the greatest efficiency of motion and the best light and ventilation. By enabling the operative to attend to a greater number of machines it permits him to produce the same number of pounds of product in less time or a greater number of pounds of product in the same time, and thus increase his efficiency.

The other factor of this efficiency problem is machinery. Just as the electric drive permits the operative to breathe regularly and see normally, so does the electric drive permit the spinning frame or loom to revolve uniformly or pulsate with normal frequency. The uniform maintenance of normal speed in cotton mill machinery is today best obtained by the electric motor applied as close to the driven machine as possible, and while there may be something better than this developed in years to come, there is nothing better today. This is not a theory, it is a fact. Uniformity of speed means uniformity of production, it means better goods and more of them.

Uniformity of speed means fewer ends down, hence better quality; it means a greater production from the same investment, it means less wear and tear per pound of product and a greater output per unit of time.

The electric drive permits of more efficient use of floor area both in amount and direction. It permits of efficiency in balancing processes and in keeping them balanced. It eliminates frictional waste of from 10 to 15 per cent. of the total power in a mill. To a slight extent already it permits of flexibility in the adoption of speeds to varying requirements, and in the near future should care for this feature to an even greater extent. It permits of exact and thorough determination of statistics as to costs and results. Statistical information is valuable, it is also largely available, but I refrain purposely from going into statistical figures at this time. I prefer to put this question of efficiency into plain English, and to point out the lines along which we should work for statistical information, and the deductions which we should draw after having secured it. but wish to state as a fact that all of the above conditions should be taken into consideration in measuring the relative cost of different methods of power utilization.

Strangely enough, the cost of this branch of the textile business is so small in comparison with the total cost of carrying on the industry that it has been given, until recent years, less attention than real importance deserves. Like a cinder in the eye, it seems mighty small to produce such irritation, and the cost of proper treatment is negligible when compared to the relief resulting therefrom.

Assuming then the fact that the electric drive means manual efficiency and mechanical efficiency, what is the best way to get the electric drive? That problem is one which must be solved in each individual case on its merit, but should not in any case confuse the mill man in deciding on the electric drive itself, whether the power to produce this is generated by a steam plant which he owns and operates or is purchased from a central station which gets its current either from steam, water power or any other source.

While the question of the cost of a horse power at the engine or at the switchboard is important, and the comparative figures on this matter are illuminating, it is not conclusive and should be given no more weight in the determining of the broad question of the effect of the electric drive by the mill man than should the question of the initial cost of the grease cups or oil cups be the determining factor in the mind of the street railway man when he decides on what is the best way to keep his cars in service and his motors in good repair.

To the mill man the question of power cost in his mill is of about the same relative importance as the question of the cost of lubricating street cars to the public utility man. Probably the greatest advance in street car lubrication has been made during the last few years, when a company organized for the particular purpose of studying this detail, has undertaken to do the engineering and practical work of car lubrication for the public utility companies.

In the manufacturing world, and particularly in the textile mills, it would seem that the power question might be handled in the same way, namely, by experts who give their time solely to this one subject, and that as the power cost is perhaps not over three to five per cent. of the total cost in the mill, that the mill manager could well afford to leave this question to an expert, who would assure him that his power costs would not be excessive and that his results would be very much improved, thereby relieving him from the necessity of studying this minor detail of his business and enabling him to spend his valuable time on matters of very much greater importance to his stockholders.

It is a fact that this practice is being adopted by a number of mill managers, and I am advised that the results so obtained are eminently satisfactory. You will see at once that what I advocate is for the mill man to turn over his power problems to the central station man wherever possible, and it is evident that with the ever broadening field of power transmission development and territorial expansion, that more and more of the mill men will be able to take advantage of this condition, if they will but make up their minds to do so. Naturally if this action is taken by the mill man the results will be an electric drive in his mill. First: because the central station man knows that, measured by actual results, this is the efficient drive, and second, because this is the only form of power which he can distribute. Where it is not possible for the mill man to turn over his power problems to the central station man, he should, nevertheless ,adopt the electric drive if he wishes efficiency, for electricity is efficiency.

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In order to produce good yarn, and this of a uniform shade, the work must be started right at the mixing room.

# IS PROTECTION BENIGN?

## The Whole Labor Question hinges on the Attempt to get Much Utility in return for little effort—Does Protection enable the average American Laborer to turn out a larger product of Commodities?

*(Contributed Exclusively to* COTTON.)

BY WILFORD I. KING, PROFESSOR OF POLITICAL ECONOMY AT THE UNIVERSITY OF WISCONSIN.

CHAPTER III.

I regret that Mr. Simons has not seen fit as yet to make any attempt to reply to my criticisms of his arguments. Instead of bringing the discussion down to a definite basis of facts and figures he apparently prefers to deal in broad generalities and unsupported assumptions. In order to fortify his position, he states it to be his conclusion "that if we could throw nine-tenths of our text books on economics into the bottomless pit and unlearn what we have learned from them the solution of the problem confronting us today would be greatly accelerated." I am unprepared to say just which tenth of the text books on political economy Mr. Simons would deign to preserve, but I presume the group would largely be made up of the works of Henry C. Carey and Frederick List.

The evident implication in the quotation just given is that modern economic theory is not a help but a hindrance in the study of the tariff. Mr. Simons apparently takes the position of the typical business man who "has no use for theory any way." A moment's reflection, however, should convince us that no one can carry on a business or engage in any of the common activities of life without basing his actions on previously conceived theories. The farmer puts in a large corn crop because he has a theory, based on more or less sufficient evidence, that corn will be high next winter. The retail merchant lays in a large stock of tan shoes on the theory that tan shoes are going to be in vogue during the next season. The cotton manufacturer buys raw material and hires men on the theory that there will be a demand for cotton goods at a price which will reward him for his efforts in promoting their manufacture. The only difference between the theory of the man on the street and that worked out by the skilled scientist is that the first is based on very incomplete and fragmentary information put together in rough and ready style while the latter is formulated only after careful and exhaustive study by many men who have devoted years, perhaps, to this particular problem and have critically compared the views and theories propounded by many of the other eminent thinkers before arriving at their own conclusions.

The tariff is most certainly an economic problem from start to finish. If considered at all, it must, therefore, be considered from the standpoint of economic theory. If Mr. Simons proposes to begin by consigning to the nether regions the works of the great economists and the fundamental truths now agreed upon by practically all who have carefully studied the subject, he places himself in the same position as the geometry student who attempts the solution of an intricate proposition and smooths away all difficulties by relegating troublesome axioms and theorems to outer darkness. If my worthy opponent proposes in this discussion to cast aside the commonly accepted laws of economics and substitute therefor sweeping assumptions and general personal impressions, I must admit defeat at once and retire from the arena as gracefully as possible, for I am no adept at that form of debate. It is only because I have too much respect for Mr. Simons' intelligence to believe that he seriously intends to take any such position that I shall consider some of the arguments which he advances in Chapter 3 of "Benign Protection."

In the first instance, I must deny the allegation that economists have failed signally in their efforts either to analyze price or to make their analysis clear to students of the subject. The analysis of price does not, however, include the regulation of price as Mr. Simons seems to assume. Furthermore, it might be stated that, at the present time, the relation of price levels to the welfare of the various classes is no longer shrouded in mystery as far as careful students of economics are concerned. Unfortunately, the great majority of our citizens have not had the opportunity to study carefully the science of wealth in its relation to the public welfare. Mr. Simons himself correctly solves this problem from the laboring man's standpoint when he says that the prosperity of the laborer depends upon his ability to get as large a quantity of goods as possible for a given amount of labor. The whole labor question hinges on the attempt to get much utility in return for little effort. In the very next paragraph, however, Mr. Simons proceeds to tell us that a high price level is advantageous to the laborer. If the price level is doubled, the laborer will receive twice as much wages and pay twice as much for the commodities that he buys. In what way has his condition been improved? Furthermore the demonstration of the exact method in which protection raises the general price level is still awaited with interest.

It is true that, in any given industry, American labor does compete with foreign labor through the competition of the goods produced by each, but this does not in any way nullify the contention that, as far as general wage levels are concerned, such competition has no significance. The fact that China can produce tea more cheaply than can the United States does not injure our laborers. We withdraw from the tea growing business and utilize our capital and labor in those lines in which we have the advantage. The fact that a farmer would be unable to hold his own in a typewriting contest in which a score of stenographers took part does not lessen the farmer's wage or income. This fact has but an indirect bearing on the issue anyway. The real question which Mr. Simons has persistently evaded is this—how does protection enable the average American laborer to turn out a larger product of commodities? If he fails to show this, he likewise fails to "make good" on his argument for protection.

Mr. Simons is evidently quite thoroughly embued with Socialistic doctrines, for he declaims loudly against the waste involved in our system of distributing goods from the producer to the consumers. That there is much waste of energy in this process is undeniable, and that this waste decreases the real wage of labor is also undeniable. It is just as indubitable a fact that this waste is nothing new, but has been going on for centuries. It is, however, a rather remarkable fact that, at this late day, Mr. Simons still clings to the long-since exploded theory that the merchant is not a producer. A producer of what? Evidently, no one can produce one atom of matter. Just as evidently, the merchant adds utility to goods as truly as does the farmer or the manufacturer. Most people prefer their beefsteak at the meat market around the corner when breakfast time comes, rather than having it located in the packing house at Chicago. Were they not willing to pay for this added time and place utility, the corner meat market could not exist. Just what bearing this whole discussion has upon the tariff question, I must admit that I am still in ignorance.

As to the further remarks concerning Napoleon, Gladstone, Abraham Lincoln and a few others of the shining lights of history, I must say that while they doubtless enhance the merit of the paper from a literary standpoint and call to mind many pleasant historical reminiscences, they seem far a field from the subject under discussion. I trust that Mr. Simons will find time in the next issue to bring out the exact way in which tariff affects the general price level; just how the general rise in prices helps the working man; exactly what objection he has to the productivity theory of wages; and, if he concedes the correctness of this theory, how a shifting of industry from more productive to less productive fields can increase real wages. I should also like to know if Mr. Simons favors impassable tariff walls between the different counties in the United States and why the principle applicable to nations will or will not apply here; whether in ordinary trade one party gains and the other loses or both parties gain; whether a tariff wall benefits both countries or only one; and perhaps other fundamental principles. It seems to me that it is time to discontinue generalities and "get down to brass tacks."

# Middle States Textile Manufacturers' Association.

The third annual convention of the Middle States Textile Manufacturers Association was held at the Louisville Country Club, Louisville, Ky., on July 17th.

President Marrs called the convention to order and the minutes of the last meeting were read and approved. Phillip S. Tuley, E. S. Hobbs and A. T. Atkins were appointed as committee on nominations. The committee on rules for the purchase of cotton made their report recommending that the present rules with one slight amendment be continued in force. After considerable discussion on this subject, the recommendation of the committee was adopted, and Section 3, Item C was amended to read, "all settlements for weights must be on the basis of mutual allowances."

President Marrs in his address gave a very interesting account of his experience in the purchasing of cotton covering a period of more than 27 years. He showed the changes that have been made in the customs and methods of handling this end of the cotton mill executives work, and the changes that have taken place in the trade. That from the former allowance of one per cent franchise the settlements of weights has now worked around to the more equitable basis of mutual allowances. He also stated that in his long experience he had noticed that cotton is not as carefully handled or packed as was the case in former days.

The last paper on the morning program was by Lee Rodman, Vice President of the Indiana Cotton Mills, on "Freight Rates and Overcharges" and as quite a number of the members requested copies, it was ordered that this paper be printed and copies furnished to each member of the Association. This paper is reproduced in full elsewhere in this issue.

At the opening of the afternoon session the committee on nominations recommended that the old officers and directors be reelected. Their recommendation was endorsed by unanimous vote and the officers and directors are as follows: President, Paul J. Marrs, Henderson, Ky.; Vice-President, Philip S. Tuley, Louisville, Ky.; Secretary and Treasurer Lee Rodman, Cannelton, Ind. Board of Directors, Robert E. Cochran, Maysville, Ky., Charles N. Bryan, Evansville, Ind., James Maynard, Knoxville, Tenn., E. S. Hobbs, Aurora, Ill.

The subject labor and labor laws came in for an extended discussion and it was the unanimous opinion of those present that manufacturers should be more alert and take the initiative in the passage of laws for improving the conditions of the operatives and in this way forestall the unfavorable laws which are being passed and agitated merely to further the political ambitions of the people proposing the laws.

Philip S. Tuley, of Louisville, Ky., then read a very interesting and instructive paper on "Costs System" and forcefully illustrated the necessity for very careful attention to this detail by all executives in charge of this part of the work. A resolution was passed fixing Louisville, Ky., as the permanent meeting place for the conventions of the Association. The meeting then adjourned.

## FREIGHT RATES AND OVERCHARGES.

BY LEE RODMAN, CENNELTON, IND., TREAS. INDIANA COTTON MILLS.

The present laws relating to interstate commerce require the shippers to possess a knowledge bordering on the omnipotent, if they are to escape loss. A knowledge of the correct rate is presumed and should the quotation or rate furnished be less than the official rate, the higher rate must be paid even though it means loss to a shipper as a result of his having accepted a contract based on the erroneous rate.

The law was amended in 1910 so as to provide a penalty of $250, accruing to the United States, for any carrier misstating a rate in writing or refusing to give a rate in a reasonable time, if the request had been made in writing

and a loss had resulted from failure to receive quotation or on account of shipment being made based on incorrect rate. As this section of the act is not generally understood, I give it in full.

"If any common carrier subject to the provisions of this Act, after written request made upon the agent of such carrier hereinafter in this section referred to, by any person or company for a written statement of the rate or charge applicable to a described shipment between stated places under the schedules or tariffs to which such carrier is a party, shall refuse or omit to give such written statement within a reasonable time, or shall misstate in writing the applicable rate, and if the person or company making such request suffers damage in consequence of such refusal or omission or in consequence of the misstatement of the rate, either through making the shipment over a line or route for which the proper rate is higher than the rate over another available line or route, or through entering into any sale or other contract whereunder such person or company obligates himself or itself to make such shipment of freight at his or its cost, then the said carrier shall be liable to a penalty of two hundred and fifty dollars, which shall accrue to the United States and may be recovered in a civil action brought by the United States."

This amendment has resulted in more careful quotations but still does not afford full relief. If more complaints were made to the Interstate Commerce Commission under this section, the errors in quotations would be materially reduced. It is not reasonable, however, to expect many formal complaints, especially when the shipper is dependent on one or two railroads; better service is secured if harmonious relations can be maintained between shippers and carriers.

As shippers can not secure reparation from carriers for loss on account of errors in quotations, the next best thing for them is to be more careful in their methods of securing quotations. Adopt a definite form and always make a request for a rate in writing, stating definitely and accurately the commodity, using the same technical description given in the classification. Where the shipper has access to two or more roads, he should request quotations from each. If located on one road only, he should make request to the nearest division office as well as to the local agent, and on important contracts, take up the matter directly with the General Freight Agent. Always insist on tariff reference being given when quotation is made. This is very important and is a great help in collecting claims should overcharge result. A little study will show that rates to cities in the same locality are closely related. A comparison of a new rate with a known rate to an adjacent city is a good check that should not be neglected.

A rate book should be maintained and some one person in the office made responsible for its being kept up to date. Upon receipt of a rate it should be entered with authority, tariff reference and date.

Rates that have not been used frequently should not be used as a basis when figuring on a large contract. It is much easier and cheaper to get the correct rate and adjusament made before shipment than afterwards. We recently had an experience which will illustrate the importance of this. For many years a carload rate on brown cotton bagging from Cannelton to western points had been carried in agent Tuckers' tariff. We did not have occasion to be interested in this rate for several years, and recently when an inquiry developed, we began investigating it before making a quotation. The R. R. officials could not locate the rate or find any reference to it in old tariffs. On being asked if they would reinstate it if it had been withdrawn, they declined, saying, that as they could not locate the original rate, it would have to be treated as a new one and in the present rate situation a reduction of this kind would call for a readjustment of many other rates which they were not willing to open up. Fortunately, we were able to furnish tariff reference and prove existence of the former rate thus making possible the restoration of a favorable rate at a time when it would have been impossible to secure a reduction. Had we taken for granted that the old rate was in effect and made shipments, we would have had to pay a rate that would have made the business unprofitable, and the restoration of the old rate would not have been brought about until too late to be of any benefit on this contract.

The fact that the restoration of an old rate is not regarded by the Interstate Commerce Commission in the same light as a new rate, and that the roads are frequently willing to restore an old rate when they would not consider making a new rate of any kind, makes it important to have a careful and accurate reference to authority and tariff. Without this reference it is often impossible to prove the former existence of the rate as the great mass of tariffs that have been issued make it impossible to get ready reference to old issues unless you know exactly the one you want.

Section fifteen of the Act to Regulate Commerce provides "that the shipper shall in all instances have the right to determine, where competing lines of railroad constitute portions of a through line or route, over which of said competing lines so constituting a portion of said line or route his freight shall be transported." This clearly establishes the right of a shipper to route his freight, though some railroads have attempted to restrict routing instructions when they could secure a better division of the rate by so doing. While the shipper has this right, care should be exercised to see that the through rate applies by the route selected. In the good old days either a combination of local rates or the through rate could be used according to which was the cheaper, and they applied by any route. Now it is altogether different. The through rate between two points must apply even through a combination is lower and the through rate only applies by the route mentioned in the tariff. Should a shipper route his shipment by a line other than that authorized in connection with the through rate, overcharges are almost certain to result with no chance for securing an adjustment to the basis of the through rate as the fault lies with the shipper.

A great many shippers overlook the advantage to be derived from being on friendly terms with contracting and travelling freight agents. Too many class these men with life insurance agents and treat them with scant courtesy. This is a great mistake—the majority of these men are very well posted and are frequently able to dig out rate and routing information which the general office clerks overlook. The personal equation counts just as much with railroad men as it does with the rest of mankind. Give a man a pleasant greeting and when you need his assistance, you get results far superior to those given by the man who has it in for you, or the office man who regards your inquiry as part of the day's work to be gotten rid of with

the least possible effort. I know of one case where a request for rate readjustment was denied a company, causing it quite a loss, because of the manager's unpopularity with the soliciting freight agents as a result of his curt treatment. On the other hand, I have frequently secured adjustments that were possible only as a result of full cooperation on the part of the street men.

As the Irishman said about trouble, the best way to handle freight claims is not to have them, but, like taxes, they cannot be avoided entirely. In making a claim state it clearly—give technical descriptions accurately, cite tariff reference to facilitate quick handling. Attach bill of lading and expense bill securely to claim after making accurate copy of each for your file. When claim is acknowledged, see that claim number is noted on your copy. Sometimes the roads lose claim papers and you should be in a position to furnish full set of duplicate papers, otherwise the matter may drag out for years. The less work you leave for the railroad and the fewer chances you give them to take up sixty days asking for additional information, the quicker you will secure settlement. Careful handling of shipments and rates will eliminate a great many claims. The following instructions furnished to the shipping department and their use enforced, will keep down the claims on your outbound shipments.

1. Give accurate description of goods in bill of lading, following exactly the description given in the classification or commodity description. Commodity rates to different sections have different descriptions and requirements. These should be referred to in rate book and be accessible to shipping and billing clerks.

2. Have each package marked with description required by classification and conform strictly to description given in bill of lading.

3. Consignees name and address should be stenciled in full on each package or if tags are used two or more should be securely sewed or tacked on.

4. Shippers name and address should always be plainly marked on every package and to assist in identification serial numbers should be used. A great many lost and strayed shipments result from careless and insufficient marking.

5. The street address to facilitate delivery should be given in bills of lading covering shipments to the larger cities.

6. The rate should always be inserted in the bill of lading. Do not expect a clerk in the local office to dig out correct rate information during the rush of billing when it usually takes the general office men several guesses before they get it right. The tendency is always to charge enough rather than too little and if you give the rate it acts as a check on the billing clerks.

The lack of close and intelligent attention to rates and shipping details is responsible for a large percentage of the losses and troubles of the shippers. The Interstate Commerce Commission is always willing to give information to anyone making an inquiry. To secure action on a complaint it is not necessary to be represented by an attorney if the complainant is able to properly set out the facts. Communications addressed to the Secretary of the Commission, Washington, D. C. will always have prompt attention. Of all the state, county and other public commissions I have had dealings with, I have found the Interstate Commerce Commission the most obliging. The following recent decisions by the Commission will be interesting to cotton mill executives.

"A decision was entered in the case of the Riverside Mills against the St. Louis & San Francisco and other railroads, in substance as follows:

"The minimum weight of 24,000 pounds applicable to the transportation of cotton factory sweepings from Cordova, Ala., to Augusta, Ga., was unreasonable to the extent it exceeded the minimum of 15,000 pounds subsequently established.

"A rate of 40 cents per 100 pounds for the transportation on less-than-carload lots of cotton factory sweepings from Lindale, Ga., to Paducah, Ky., was unreasonable to the extent it exceeded the rate of 32 cents subsequently established.

"When a shipment of cotton factory sweepings or cotton waste is tendered to the carrier which requires a car of greater capacity than can be furnished by the carrier, two or more small cars should be furnished and charges assessed upon basis of the actual weight of the shipment, but not less than the minimum weight prescribed in the tariff for a carload.

"A rate of $1.89 and carload minimum weight of 30,000 pounds applicable to the transportation of cotton waste from Augusta, Ga., to Clifton, Ariz. is not, upon the record, shown to have been unreasonable."

These decisions illustrate the wide variety of requirements as to carload weights on the same commodity. The usual minimum carload weight for cotton factory sweepings is, 20,000 lbs. Cotton waste generally takes a higher minimum, and I have known of cotton factory sweepings being billed out as cotton waste causing a loss on account of greater minimum weight being required and no commodity rate being in effect.

In conclusion, it appears that this end of a business needs more attention on the part of the executives and is entirely too complex to leave to minor employees as is frequently the case.

## COST SYSTEMS.

BY PHILIP S. TULEY.

The discussion of so vital a subject as cost system in cotton mills is approached in this presence with embarrassment and trepidation. Whatever is said in this connection will be with the hope of developing from others greater and more valuable information than is likely to be put into this paper. It is desired that all remarks on this subject may give rise to discussion and suggestions, as a result of which we confidently expect to acquire ideas of value and data worth while.

It is axiomatic that cost systems are essential to the intelligent operation of any manufacturing plant. On a knowledge of the cost of its product depends the decision whether to accept or refuse proffered business. Prices cannot be safely fixed in the absence of such accurate knowledge of cost. We have often felt that amongst some of our competitors such cost systems were not in vogue. Otherwise competitive prices would not trench so close upon and frequently fall below outright cost. Ruinous competition is not always to be explained by the fact that competitors have bought their raw material at exceptional advantage. The average mill possesses nowadays an equip-

ment more or less modern and commands the services of operatives of average training. Otherwise, such mills could not survive. It is therefore all the more a fair inference that where prices are consistently too low to net a fair manufacturing return, the prices are named in ignorance of the actual cost.

We have frequently felt, moreover, that where costs are kept they do not always embrace depreciation of plant. This is a factor which cannot safely be disregarded, and in our judgment the manufacturer should lean towards the liberal side rather than to the conservative in fixing his depreciation. This is not always wrapped up solely in wear and tear. On the contrary it is frequently found in the circumstances that his equipment has become obsolete by virtue of new inventions, resulting in the possibility of installing machinery of productive capacity far in excess of machines of older type.

It is to be feared, moreover, that not all manufacturers resort to the rigid classification of cost in detail. On the contrary many manufacturers are satisfied to classify expenditures under general heads as repairs and expenses. Much valuable information can be secured by keeping accurate records of all expenses of manufacture under a variety of accounts. In this way it can be determined, in accordance with the output, whether or not there had been undue increase in such items as fuel, oil, water, repairs, expense, insurance, taxes, etc. The operating department of the mill will of necessity find such information of great value and by recording expenditures in such detail it likewise gives the executive and administrative department a thorough grasp upon such matters.

Entering on the subject of the cost of conversion after raw material has entered the mill, it is of course essential to keep an accurate account of shrinkages in process, so as to arrive at the net weight of fibre properly to be regarded as the divisor into the wages, kept separate for each individual successive process. In other words, to arrive at the element of picking cost in yarn or fabric, it must be remembered that the pounds passing through the picker cannot be used as the divisor, but rather such number of pounds as is arrived at by taking into account the loss in the subsequent processes. A similar reduction in the number of pounds used as a divisor should be made for each successive process, so that when all of the results are ascertained they can be added together and give a thoroughly accurate final cost of the fibre in the finished state.

It was pointed out by the writer of a paper at the recent meeting of the National Association of Cotton Manufacturers that the cost of each hank roving, or number of yarn, should be arrived at by a system which impresses us as well worthy of consideration. He stated that the strenuous times which cotton mills have passed through in the last ten years and the difficulty of keeping the plants in continuous operation, had induced many manufacturers to change over from products habitually made to others holding out hope of greater profit, or of the chances that the plant could be more continuously operated on such new lines. It was his contention that in many instances, where such changes would involve radical departures from previous customs, the precaution was not taken to ascertain precisely what bearing on cost such departures had. It was his suggestion that the overhead or general expense of the factory itself and of each room should be kept separate and the cost per spindle per day should be ascertained for each department or process. When this has been ascertained, the actual production per spindle for a similar period, whether for the day, the week or longer period, should be ascertained, so that by dividing the production per spindle into the overhead cost per spindle the actual cost per pound for each individual hank roving, or number or yarn in any process could be definitely ascertained. This system he pointed out would make it possible to ascertain the actual cost of any number of yarn spun and would put the cost precisely where it belonged. Any other plan of ascertaining the cost of hank roving, not usual or customary, would simply be a matter of estimate whereas this plan would give the actual result. In this way it could be determined whether or not the production of these unusual numbers of yarn was safe or even desirable.

We propose to adopt some such plan in keeping track of our cost. It is particularly desirable in so far as we are concerned because we spin so many different numbers of yarn, and of course are called upon to provide so many different preparations of roving.

We also have in mind the expedient of keeping track of the production of every machine, following the drawing, by the use of hank clocks. We propose to establish a schedule of what we should be satisfied to regard as a normal and fair production for each of these machines, whether it be a slubber, intermediate, fine frame or spinning frame. We shall keep an accurate account of the number of hanks produced by each frame and by reference to the schedule of roving or yarn under production we can determine at the end of each week the number of hanks turned out and be able to compare with the normal number of hanks that should have been turned out, thus arriving at the percentage of efficiency of the plant. Of course no two mills would hit upon precisely the same scale of normal production. This would have to be a matter to be determined by each mill for itself and according to the class of stock used, the numbers of yarn spun, the twist introduced, etc.

We have the feeling that to keep an account such as this we shall be able to derive information of great value. It will help us to tell whether or not we are getting out of each respective process what we have a right to expect. It will put the overseers on their mettle. Where the efficiency is defiicient it will remain to be ascertained whether it is to be accounted for by the mill being out of balance or whether the help has been deficient in number or in actual efficiency.

It will demonstrate whether matters can be improved by more energetic overseers and by a consistent endeavor on their part to train the help more thoroughly. In many ways we cannot but feel this will be a helpful and valuable adjunct to the cost system.

Finally it is proper to say that in our judgment this system of keeping track of costs should be followed regularly, systematically and courageously and that it should, so far as practicable, be performed by the same persons, and also, as far as is practicable by persons who are aloof from the manufacturing department so that the actual calculations and tabulations will be made without bias or influence.

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**The spindles should be set in center of its mate ring, and the guide wire properly adjusted.**

# HOW TO SAMPLE COAL.

*(Contributed Exclusively to* COTTON.)

BY E. G. BAILEY, MECHANICAL ENGINEER, FUEL TESTING CO., BOSTON, MASS.

## FUNDAMENTAL PRINCIPLES OF SAMPLING.

Much money is wasted by having non-representative samples of coal analyzed; unwarranted complaints are often based upon analyses made from such samples; and sometimes unjust premiums are paid or penalties exacted, due to the samples not truly representing the coal from which they were taken.

Properly taken samples of coal are of great value, for the correct analyses of them assist the coal operator to intelligently direct the workings of his mines and the preparation of coal or coke being produced; they aid the sales department in placing coal where it will give the best satisfaction, and they make it possible for the consumer of coal to buy intelligently and secure the fuel best adapted to his needs. But non-representative samples are worse than valueless under all circumstances.

The variety of conditions under which coal and coke must be sampled makes it quite impossible to follow any one method without some deviation. However, there are a few general principles, which, if understood and practised, will greatly increase the value of samples taken.

Coal should be sampled:

1. By taking equal increments from a great many equal parts of the original quantity.
2. By taking increments of such size that the largest lumps may be included.
3. In such a manner that a true proportion of all sizes will be secured.
4. Blindly, so far as slate and impurities are concerned.
5. By taking such a quantity that the largest pieces of slate or impurities will be insignificant in proportion to it.

The original sample should be reduced in such a manner that: (1) the part discarded is exactly like that retained: (2) there will be no loss or gain in moisture; (3) no dust or other material will be blown away or lost through cracks in the floor; and (4) no foreign matter will get into it.

The above fundamental principles should be followed, whether the coal is sampled in the mine, as it is being burned, or during any intermediate stage of its transportation, but the detailed method of applying them will naturally vary with conditions. Some of the principles are self-evidently essential, while others may at first appear to be unnecessarily precautious.

## TAKING THE ORIGINAL SAMPLE.

There may be a great difference in the quality of coal in different parts of a car, cargo, or pile, therefore if a sample is to represent any of these quantities of coal it should be accumulated from enough different parts that it will represent the average, rather than merely the coal which happens to be most available. In many cases it is impossible to comply with this condition, except where the coal is being loaded, discharged, or rehandled. Coal becomes better mixed each time it is rehandled, thus reducing errors arising from failure to fully comply with this stipulation.

A small shovel or scoop of two or three pounds capacity is well enough for accumulating samples of slack or small sizes of anthracite, but it would evidently be wrong to take such small increments from run of mine or prepared sizes where large lumps are present. When coal is extremely lumpy it is best to break a proportional amount of the lumps before taking the various portions of the sample. As a rule, 10 to 20-pound increments are satisfactory for the ordinary sizes of coal.

There is a natural tendency for a person to take a larger amount of fine coal than is proportional to the total, when taking a sample by shovel. In other cases the coarser coal may be more available, and with a mechanical sampler it is possible for a constant error to exist in obtaining an undue proportion of either the fine or coarse coal. Such conditions should be carefully avoided to prevent serious errors. In some coal the fine material is much higher in ash and sulphur, while in others the reverse is true. A mechanical sampler can not discriminate for or against slate and other impurities, and if the sample is taken by shovel, the person doing so should be as blind to such impurities as is the machine. There is no one who can possibly be capable of judging whether any certain impurities should be included or rejected, as he can not view the entire quantity of coal as carefully as he can the sample; but even if he could, it would be useless for him to attempt to accurately estimate the proportional amount of impurities. The only safe way is to accumulate portions of the sample from equal parts of the whole, and leave the amount of impurities entirely to the law of chance.

## QUANTITY OF THE ORIGINAL SAMPLE.

The total weight of the original sample accumulated is of the greatest importance. For illustration, take the problem of sampling 100 tons of coal containing 200 pieces of slate which weigh 1 pound each. This corresponds to a 1-pound piece of slate to each 1,000 pounds of coal, or only 0.1 per cent. ash over and above the other ash contained in the coal, which, we will say, is 6 per cent., making the total correct ash 6.1 per cent. If a person took a 10-pound sample, which is as large as many people do take, it is possible for one of these 200 pieces of slate to be contained in it, which would amount to 10 per cent. in addition to the 6 per cent. intrinsic ash, making 16 per cent. total ash in the sample. Even a 100-pound sample containing one piece of this slate would show 7 per cent. ash, instead of the true 6.1 per cent., and unless a person has actually counted the pieces of slate in the entire 100 tons he does not know whether or not he should have one or more such pieces of slate to every 100 pounds he might happen to take as a sample; but if a 1,000-pound original sample were taken, and it had even two or three pieces of slate more or less than the true proportion, it would cause an error of only a few tenths of a per cent. ash, which is allowable.

If this 100 tons of coal contained 2,000 pieces of slate, weighing 1 pound each, the true ash would be 7 per cent., and while there is one piece for each 100 pounds of coal, a sample of this weight might happen to contain several, and each one would cause an error of 1 per cent. Even a 1,000-pound sample, which should contain 10 such pieces of slate, might happen to contain only 5, or as many as 15, which would correspond to a possible error of 0.5 per cent. below or above the average, as compared with less than half this possible error with the smaller amount of free slate.

In order to secure an accurate sample of coal it is abso-

lutely necessary to take such a large original sample that several of the largest pieces of slate or impurities more or less will cause no material error. The larger the size of the pieces of impurities, the larger should be the original sample to prevent excessive error, and the same is true with respect to the quantity of impurities. In a similar manner the quantity of impurities and the size of sample to be divided should govern the fineness of crushing the sample throughout the various stages of dividing and quartering from the original sample to that which is pulverized in the laboratory for analysis. The total percentage of ash or impurities does not indicate the size of sample which should be taken, but it is the impurities existing as slate, bone, and extraneous matter which should be considered, regardless of the amount of impurities distributed uniformly through the coal itself.

On account of the variation in the size and amount of the impurities in different coals, it is impossible to state how large a sample should be taken in each case. Many coals contain between one and two per cent. of ash in the form of slate and free impurities, and when the larger pieces of slate do not weigh more than one pound, a 2,000-pound original sample would be sufficient for reasonable accuracy. If there is any doubt about the quantity of sample that should be taken, it is best to pick out all slate and bone larger than one-half inch from the sample as it is being taken and weigh it, and from the weight of sample from which it was taken, determine the approximate percentage of ash existing in this form. With this data and the size of the largest piece of slate, one can determine the quantity of sample which should be taken by referring to Table I. All of this slate and bone should then be broken and thoroughly mixed with the coal before quartering it.

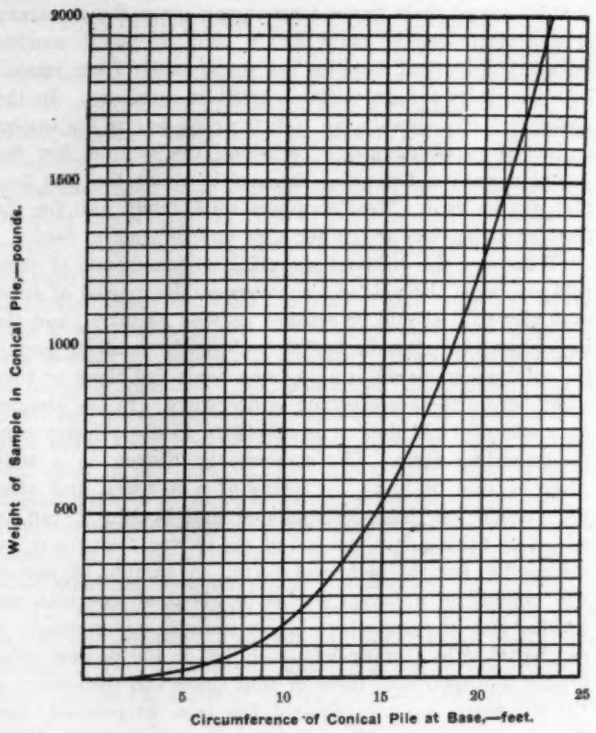
TABLE I.

WEIGHT OF ORIGINAL SAMPLE TO BE TAKEN.

| Largest size of slate existing in coal. | 1-2% ash in free impurities | 4-5% ash in free impurities. |
|---|---|---|
| 2 inch screen | 2,000 pounds | 4,000 pounds |
| 1½ " " | 1,000 " | 2,000 " |
| 1¼ " " | 600 " | 1,200 " |
| 1 " " | 300 " | 600 " |
| ¾ " " | 120 " | 250 " |
| ½ " " | 50 " | 100 " |

Samples of the above size will also insure suffic ent accuracy in the sulphur determination unless there is a large percentage of sulphur balls present, in which case the sulphur would be much higher than exists in coal used in iron, steel, and gas industries, and extreme accuracy would not then be required.

The most satisfactory method of determining the approximate weight of samples accumulated is to measure the conical pile. The circumference at the base and the slant height are the dimensions most readily determined. The slant height is very nearly one-fifth of the circumference, and whatever variation there may be from this figure causes only a slight error, so the weight of coal in a sample can be expressed in terms of the circumference of the base of the conical pile. This can easily be measured by means of a 25-foot tape measure, and from the curve in Fig. I the weight of coal can be determined accurately enough for all practical purposes. The size and percentage of the impurities has more influence on the amount of the original sample to be taken than has the quantity of




coal to be sampled. It has often been stated that a certain percentage, say 0.1 per cent., of the original quantity of coal should be taken as a sample, which would mean about 15,000 pounds from a 7,000 ton cargo, and 50 to 100 pounds from a railroad car. As a matter of fact, the same size sample should be taken from each, if they contain the same kind of coal and the same accuracy is desired in each case.

REDUCTION OF THE SAMPLE.

The original sample is larger than can be conveniently sent to the laboratory, and the manner by which it is reduced to a smaller quantity is equal in importance to the method of accumulating the original sample. It is usually broken, mixed, and divided repeatedly until any desired quantity remains. In doing this it is essential that the part discarded be exactly like that retained, and so long as this is true the final sample represents the original. In order to meet these conditions it is necessary to break all lumps of coal, slate, and impurities into very fine particles, as compared with the quantity of sample before every division, in order that the slate and impurities may be equally distributed throughout the whole by thorough mixing. Table II will be found of assistance in determining how fine the sample should be crushed before mixing and dividing.

TABLE II.

| Weight of sample to be divided. | Size to which slate and impurities should be broken. |
|---|---|
| 4,000 pounds | 1½ inch |
| 1,200 " | 1 " |
| 500 " | ¼ " |
| 200 " | ½ " |
| 50 " | 2 mesh |
| 5 " | 4 " |

It is not necessary for the lumps of coal to be broken as fine as should be the slate and impurities. When taking large samples of coal, a person should have a smooth solid floor upon which the sample can be broken and mixed, also an easy rapid method of crushing the coal. Where a great

deal of sampling is to be done at one place the necessary arrangements can be made and a hand or power crusher installed, but when samples are to be taken from miscellaneous places a light portable outfit is necessary. In the absence of any crusher, an iron tamping bar is the easiest and most rapid method of crushing the sample, but for portable work a flat sided hammer is about the best tool that can be used. Meat choppers work fairly well for the finer crushing, but are rather slow and difficult to feed.

Whenever the different shovelfuls or increments of samples are taken throughout some considerable period of time, each shovelful should be crushed as soon as taken, and the impurities can often be broken sufficiently small to permit the total accumulated sample to be quartered three or four times before further crushing is necessary. In the absence of a smooth tight floor it is necessary to use a heavy canvas sampling cloth. The coal can be broken on a solid piece of iron or block by means of a hammer, and after the sample has been accumulated and broken it can be mixed by raising first one end of the canvas, then the other, rolling the sample back and forth. A sample of 300 or 400 pounds on a canvas 6x8 ft. is about all one man can handle, and in cases where larger samples are necessary it can be taken by installments, each 300 or 400 pounds being broken and quartered three or four times and then reserved till the entire sample required has been so reduced, then they can be mixed and worked down as one sample.

After a sample has been broken to the size corresponding to its quantity, as given in Table II, it should be thoroughly mixed by shoveling it over and over several times, or by rolling back and forth on a canvas, before it is divided. Original samples larger than 300 pounds can best be divided by discarding alternate shovelfuls, while samples of about this size or smaller can be formed into a conical pile and divided through the center into four equal parts and the two opposite quarters discarded. The part of the sample remaining should be crushed smaller, again mixed and divided, or quartered, until it is finally reduced to not less than 25 pounds, all of which will pass through a 2-mesh sieve; or 3 pounds, finer than 4-mesh; which may then be sent to the laboratory. A man can take and properly work down a sample of 1,500 pounds of soft semi-bituminous coal in a day, doing all crushing by hammer. A correspondingly less amount of the harder gas and anthracite coal can be taken and reduced, much depending upon the average size of the original coal.

### SPECIAL MOISTURE SAMPLE.

The percentage of moisture contained in the coal sampled should be determined as accurately as is the ash or any other constituent, but this is impossible if a sample is taken in the manner just described, even though it is sent to the laboratory in hermetically sealed jars or cans. In other words, it is impossible to obtain a sample which will correctly represent the ash and sulphur and still retain the original moisture, if it is worked up in the open air. The necessary crushing, mixing and dividing cause a loss of two to three per cent. of moisture under average weather conditions. The only method by which the true moisture can be determined under normal conditions is by taking a separate special moisture sample. This is accumulated by placing small quantities from the freshly taken portions of the original sample into a hermetically sealed receptacle, which is not again opened until it reaches the laboratory. This special moisture sample is used for no other purpose than to obtain the total moisture in the coal sampled. The analysis of the other sample, which is practically air dried by the time it reaches the laboratory, should be calculated to the total moisture, as determined from the special moisture sample, in order to obtain the true analysis of the coal sampled.

It might seem unnecessary to caution against losing any dust by the wind, or fine coal sifting through cracks in the floor, but errors due to failure to realize the importance of such precautions are often encountered. Another error is sometimes caused by hard pieces of bone or slate flying out of the sample when struck a glancing blow with a hammer.

## COTTON STANDARDIZATION.*

BY D. E. EARLE, EXPERT, BUREAU OF PLANT INDUSTRY, WASHINGTON, D. C.

The official cotton grades have met with the approval of most of the Southern cotton exchanges, and have been formally adopted at the following places: New Orleans, Memphis, St. Louis, Little Rock, Natchez, Mobile, Macon, Galveston and Charleston.

The New England, the Texas, and also the Southern Cotton Buyers' Associations have agreed to make the Official Grades the basis of their operations. For any grower who desires the grades and feels that he cannot afford a complete set, the Department of Agriculture has arranged to fill orders for any three grades. Low middling, middling, and good middling, for instance, usually cover the bulk of the crop, and for white cotton these three boxes would indicate the grade fairly close.

The price of the nine Official Cotton Grades has been reduced from $30.00 to $25.00, and the price of the fractional sets have been reduced to $9.00 (i. e. $3.00 per box or grade).

There is a natural and increasing demand upon the mills to manufacture better and finer articles of clothing. With more money per capita, higher wages, and shorter working hours, more attention is given to dress. This, of course, is giving the mills a greater opportunity for diversification and the manufacture of a higher and finer grade of cotton goods which requires a longer staple than the average 7/8 or 1 inch Upland fiber.

Standards for the various lengths of staple may be of special interest. For every 1/16 of an inch increase in the length of the staple adds more to the market value of a cotton than does a full grade in the classification. The department is making progress toward the establishment of these standards ,and they will probably be issued during the next year, and will be continued thereafter.

There is beyond doubt more controversy in the trade concerning the length of staple than there is concerning the grade which is only a question of color and foreign substance. Different cotton experts vary considerably in their estimates for the length of the same cotton. This is often due, no doubt, to the fact that all do not pull the staple in the same way. A rule used for measuring the drawn sample, therefore, is not always a fair index to show the length, for one classer may discard more short or long fibers when drawing than another. If, however, every one had the same standard for 1 inch, 1⅛-inch, and 1¼-inch,

*Abstract from address before Farmers' Institute, July 6th, Anderson, S. C.

etc., the cotton in question could be compared against the standard, both being pulled in exactly the same way, and there is no doubt but that a more uniform and accurate estimate could be made. Any factor which aids the uniform handling of a crop by the trade tends towards uniformity in price of that corp, and the producer no doubt is the gainer.

A group of farmers growing a certain variety of long staple cotton may well afford a suitable gin to be used only for this variety, thereby obtaining a better sample and keeping their seed pure. I know from personal observation that a considerable amount of staple cotton is badly damaged by being ginned on the ordinary saw gin. Where this type of gin is used, the saws should be wider apart, run at a slower speed (say 300 R. P. M. on green cotton or 350 on seasoned cotton), and the grids should be specially constructed.

The much talked of reforms concerning baling and handling cotton do not seem to take place very fast. It is a question that requires the cooperation of the mills, the ginners, and the growers alike. Any of the mills will tell you that they prefer to receive a neat well covered bale with a minimum amount of tare, and many of them will pay a premium for it. Some of them, however do not help the cause, for they patch up the ragged bagging removed from their cotton which is very often second-handed to begin with, and sell it back to the ginners at a nominal price. This only tends to aggravate the trouble, for some mill will have to pay for this extra tare and besides receive a ragged, inflammable and dirty bale of cotton. If the growers demand a new covering for their cotton I believe that they will get it, and the second-hand bagging will be rewoven or discarded.

During the past season the Bureau of Plant Industry made several ginning and baling experiments to see just what market value the careful handling would give to the ordinary type of bale. To begin with the different pickings were stored and ginned separately, so as to give a uniform grade throughout the bale. The cotton was stored in the seed from four to six weeks and then ginned at a slow speed, (about 400 R. P. M. for the short staple). Samples were collected at the press and a certificate of the grade and staple was placed on each bale. The bales were entirely covered with 23 pounds of closely woven bagging that was suitable for holding the marks.

This cotton was shipped in five and ten bale lots to progressive mills in different parts of the country and these mills were requested to make a report on the market value of such methods. The smallest premium offered by any mill for cotton handled in this way, besides paying for the cotton as actually classed, was 75 cents per bale. Some of the mills, however, were willing to pay a premium of $1.25 to $2.00 per bale. These experiments will be continued during the coming season.

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An American forwarding firm has written the Bureau of Manufactures that it has an inquiry from one of the largest hosiery firms in an European country for American hosiery. The foreign inquirer is willing to buy against cash in large quantities. It is said that he has nvestigated the market, prefers American goods, and feels confident that he could work up a large trade in this line of merchandise. For further information apply to the Bureau of Manufacturers, Washington, D. C., and refer to file No. 8833.

## COTTON STOREHOUSE OF THE MASSACHUSETTS COTTON MILLS.

What is undoubtedly one of the finest warehouses for cotton storage ever erected in this country is that of the Massachusetts Cotton Mills at Lowell, Mass. When this company was confronted with the necessity of additional space for their raw cotton the problem presented was more or less difficult in view of the fact that the mills are located in the heart of the city of Lowell where land is expensive, fire risks great and insurance rates high.

Across the street from the present mill there was available a plot of land 100 feet wide by 256 feet long. It was decided to utilize this property provided a structure to properly meet the conditions could be designed. These conditions were, first, a minimum of 300,000 square feet of floor area; second, a fire and waterproof building divided into units in any one of which a fire could occur without affecting the stock in other parts of the building; third, a structure so handsome architecturally that it would be in keeping with the appearance of the handsomest class of office buildings or other public structures.

The task of designing the structure to meet these conditions was intrusted to the company's engineers, Lockwood, Greene & Co., of Boston, Mass. To secure the requisite floor area in the building on the ground available required

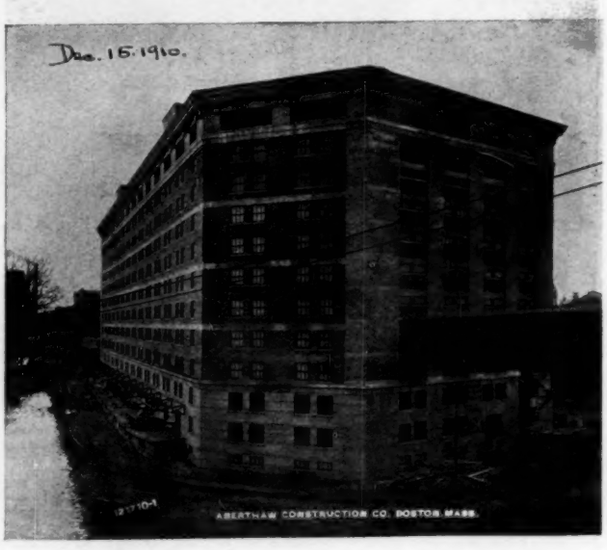


FIG. 1. AN EXTERIOR VIEW OF THE STOREHOUSE.

a building twelve stories in height. Preliminary sketches and estimates indicated that the most economical type of building to construct which would be both fire and waterproof and at the same time practically free from depreciation expense, would be of reinforced concrete. On account of the saving in head room and also on account of the ease and cheapness of construction the mushroom or girderless type of interior floor construction was adopted. In the final design, the total height from finished floor to finished floor is only eight feet. The great weight on the columns in the lower stories would have necessitated such large reinforced concrete columns that much valuable floor space would be used up, consequently, structural steel columns encased in concrete were adopted.

The exterior walls, resting on concrete footings supported by concrete piles, are of solid concrete for the first three stories, the next eight have a concrete frame-work

paneled with brick, while the top story and the heavy cornices are of reinforced concrete. The brick panelling the grooving of the surface of the concrete on the first three floors and the heavy cornice, give the building a handsome and dignified appearance, while the low story heights convey the impression that it is much lower than is actually the case.

There are five longitudinal rows of columns 16 feet 8 inches on centers, the building being divided longitudinally into 16-foot bays. Each line of columns across the building is supported by a heavy continuous reinforced concrete girder extending the entire width of the building, this girder resting on a double line of concrete piles. There are three concrete fire walls extending the full width of the building from basement to roof, which divide the building into four equal parts of four bays each. In one end section of the ground floor, to be used as the opener and breaker room, the second floor is omitted, giving a ceiling height of 16 feet. It will thus be noted that the building is divided

FIG. 2. AN INTERIOR VIEW.

into 47 fire and waterproof compartments. Along the rear of the building there is a concrete loading platform alongside of which is the railroad siding. Large 6-foot doors open from this platform into the first floor of the building. In the two middle compartments adjacent to the fire walls of the end compartments and on the platform side of the building, there are two shafts completely enclosed in concrete fireproof walls which extend the entire height of the building. These shafts are 15 feet, 8 inches wide, by 22 feet, 6 inches in the clear and in each one is located an elevator and stair tower.

As mentioned above, the floor construction is of girderless or mushroom type of reinforced concrete, the slabs being 7 inches thick and the reinforcement consisting of bands of half-inch rods spaced 7 inches on centers, each band being 7 feet wide and running parellel to and perpendicular to the lines of columns and also diagonally in both directions. The floors are granolithic finish placed integral with the structural floor slab. The roofing is of standard five-ply tar and gravel roof. The windows throughout have metal frames with wire glass.

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Inquiries about anything pertaining to the textile industries will be cheerfully answered by COTTON.

## PERUVIAN COTTON.

(*Contributed Exclusively to* COTTON.)

BY A. J. WOLFE.

Peru is understood to be a tropical country, yet the coast region which harbors the bulk of the population is very mild in climate, and the temperature rarely rises above 86 degrees or falls below 54. There are three distinct zones in Peru; the coast zone, the sierra and the mountain zone, and they all differ widely with regard to conditions and resources, though all are seats of important agricultural industries.

A large part of the coast region of Peru is arid, but these areas are cut through by 55 rivers, and the cultivable territory watered by these streams exceeds 1,500,000 acres. Only2/5 of this is now irrigated and in use. The sandy soil is considered one of the richest in the world, for not being washed out by the rains, it retains many of the natural chemical elements, which have to be artificially supplied in other countries.

The Government of Peru has initiated a vast irrigation scheme which is in charge of an American engineer, Chas. W. Sutton. The Government also sent an expert to the United States to study the problem of the application of dry farming, as related to the conservation of moisture.

In the coast region of Peru thrive many temperate, as well as tropical fruits and vegetables. Higher up in the Sierras the hardier fruits and potatoes, wheat, barley and corn. In the Sierras likewise flourish coffee, tobacco and many other crops. The rain fall averages from 50 inches per annum in the upper portions to 120 inches per annum in the lower portions of the Atlantic slope, diminishing to practically nothing on the coast line. In the upper plateau there are frequent snow falls feeding the numerous lakes and rivers.

In the mountain region, (the Atlantic slope of the Andes below the altitude of 5,000 feet), exists the most extensive system of navigable rivers in the world, feeding the Amazon and carrying traffic to within 250 miles of the Pacific.

Cotton is produced in Peru under the most favorable conditions, and the industry is said to be flourishing. In Peru are obtained the greatest cotton harvests in the world per unit of area. Upland cotton gives in the Canete valley an average of 553 pounds per acre, as high as 963 pounds being obtained, and a maximum of 1,384 pounds was reached in the valley of Lambayeque. Sea Island gives an average of 442 pounds. Mit-Affifi gives up to 550 pounds on the coast and 830 pounds in the upper valley of Pativilca. The Peruvian average production is 484.4 pounds.

The native cotton *"Gossypium Pervianum"* gave 624.98 pounds per acre in the last harvest, yielding 235.23 pounds of ginned fibre per acre. This cotton commands a 10 per cent higher figure in the market, being entirely utilized in the admixture of woolens, for which purpose it is said to be exceedingly well adapted. It grows nowhere else in the world, excepting certain valleys in the Peruvian coast region.

The cost of production of upland and other long fibre cottons in Peru, including irrigation, runs from 6.6 to 7.6 cents American gold per pound of ginned fibre, which is about equal to American figures. Native cotton costs only

5.7 cents per pound to produce, because the life of the plant is from four to six years and the annual expense is thus limited to cleaning up, watering and harvesting. With the adoption of agricultural machinery it is expected that the costs will decrease still further, while the area under cultivation is capable of great extension even without the addition of water provision which will be supplied when the irrigation plans carry through.

The consumption of cotton in the factories of Peru in 1909 was 2,500,000 kilograms (1 kilogram being equal to 2.2 pounds) of ginned cotton, and the total production was 52,624,843 pounds. The figures of cotton exports from Peru are contained in the following table:

| | 1903 Kilogram | 1909 Kilogram |
|---|---|---|
| Rough and moderate | 2,473,077 | 7,041,444 |
| Peruvian | 4,906,686 | |
| Smooth | | 13,793,511 |
| Sea Island | 271,596 | 553,301 |
| Total | 7,651,358 | 21,371,256 |

There are seven cotton factories in Peru, five of which are located in Lima, one in Ica and one in Areouipa. The number of spindles is 52,250, and of looms 1,750. About 2,000 hands are employed, and the annual cotton consumption of these mills is approximately 12,000 bales.

Of these mills, the five at Lima are the Inca, with 12,000 spindles and 400 looms; the Vitarte, 10,000 spindles and 325 looms; the Victoria, 8,000 spindles and 300 looms; the Progreso, with 5,000 spindles and 160 looms, and the San Jacinto, with 2,250 spindles and 65 looms; the mill at Ica is the Andres Malatesta, with 5,000 spindles and 150 looms, and at Arequipa the Huaico mill owned by M. Forga e hijos, with 10,000 spindles and 350 looms. The owners of the two factories last named act as their own agents, while W. R. Grace & Co. act as agents for the first three, and Duncan Fox & Co for the Progreso mill.

The goods turned out are grey sheeting and drill, coarse colored cotton (stripes), while the Inca mill makes bleached goods. Most of the goods are used in Peru, and one third of the white shirting used in the country is made in the domestic mills. No prints are made in Peru. There is a fairly good export in grey sheeting to Bolivia There is also an underwear factory with a capital of $160,000. There are nine factories devoted to cotton seed oil extraction, three of which are located in Lima. The Government conducts a cotton experimental station in connection with the school of agriculture.

In the German "Memorial on the Cotton Problem," a parliamentary paper issued by the German Colonial Office, the opinion is expressed that artificial irrigation would prove of exceeding benefit to the Peruvian cotton region (the principal section being Piura, in Northern Peru). Rain, it is said, falls at intervals of seven years, and the harvest is frequently a failure in the intervening years.

Peruvian cotton is divided into several very distinct classes. The principal part is played by the Rough Peruvian," the native kind, called by the Peruvians "algodon de pais." This is a perennial plant, which in the course of several years cultivation develops in a tree-like manner. The cotton begins to ripen ten months after sowing, but the harvest is slight the first year. The principal yield is obtained after twenty months. Then it goes slowly down and after five years it is generally replaced by new cotton.

This cotton is strong, rough, feels "woolly" in the fibre and is distinguished by white color and cleanness. Mixed with wool, it can hardly be told from the latter. The loss in spinning is very slight, and this Piura cotton is even highly prized for these qualities in the United States. The American Upland cotton is queerly misnamed in Peru "algodon de Egipto," (Egyptian Cotton). It yields its harvest after six or seven months and as the result of soil and climatic conditions, as well as of fructification by the native cotton, a special kind has developed in Peru, growing several years and furnishing better staple.

The "Caravonica" grows here also in its variations "silk," "wool" and "alpacca." The first yields its harvest after six months, and the other two after eight months. The yield is plentiful. The well known Peruvian planters Hilbeck & Co., have cultivated a species from the seed of the native cotton which exceeds in harvest yield all the other Peruvian cottons. This cotton is a kind between the rough and the soft Peruvian. It yields a rich harvest after seven months, and averages very well for several years.

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Several important foreign importers and dealers in cotton goods are anxious to handle American cotton goods and would like to hear from exporters who are interested in this matter. These names are furnished by one of the commercial agents of the Department of Commerce and Labor who has personally interviewed the importers and who states that this is an excellent opportunity for American manufacturers to form good connections and secure a large share of the trade. The kinds of goods which are most widely sold are 36-inch, 3 and 3.50 yard sheetings, bleached goods, prints, ginghams, duck, drills, flannels, and printed handkerchiefs of all kinds. Correspondence should be in French, but English is understood. Names of the firms referred to can be obtained from the Bureau of Manufacturers. For further information apply to the Bureau of Manufactures, Washington, D. C., and refer to file No. 8889.

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Cotton spinning, which was at one time an important industry in Glasgow, is now carried on only to a limited extent. The industry was in much more flourishing condition at the end than at the beginning of 1911. This was especially true of spinners using American yarns, in which a good business was done in the lower counts. The high price of Egyptian cotton, on account of the short crop, caused weavers to use American yarns where otherwise Egyptian would have been employed. The margin of profit in the spinning industry throughout the year is said to have been small. The thread mills at Paisley report an exceptionally good year, the home and foreign trade being well maintained.

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Exports of British piece goods for the first four months of this year reached 2 1-5 billion yards. Especially noteworthy are the large sales to China, with large increases in bleached, printed, and dyed cloth, and the steady development of the English cotton-goods trade in the Balkan States and the Levant generally. The Bureau of Manufactures at Washington has been making special investigations of the Near Eastern textile markets, and several publications relating thereto, with samples, prices, etc., are available to American manufacturers and their agents.

# Mill Conditions and Market Reviews.

## SOUTHERN MILL SITUATION.

*(Special Correspondence)*

The event of greatest interest to Southern mills this month has been the report of the Government on the acreage and condition of the cotton crop, which was issued on July 3rd. It has been customary in the past to issue this report in June, but by act of Congress it will not be issued hereafter until July. The report showed an acreage planted of 34,097,000, as compared with 36,681,000 acres planted last year, up to date of the report June 25; the condition of this year's crop is shown to be 80.4 per cent of normal, as compared with 88.2 last year. Immediately following the issuance of this report the price levels of the staple have gone up quite perceptibly, having gained about 150 points since the first part of the month. Cotton is selling now around 13¼ cents as compared with 12½ that it was bringing at the time of the crop report. The fact that the amount of cotton stored now has become almost nothing might also be ascribed for the price of the staple being so high, but the fact is that very little cotton can now be found in any of the warehouses and the carry-over will be one of the smallest on record.

The effect of the price of cotton on the markets has been shown both in the yarn and cloth markets, and the prices now obtaining in both of these markets are higher and firmer than has been the case for the past four weeks. At the first of the month the spinners declared that they would close down their mills and remain idle a part of the summer months rather than accept orders and run their plants at the prices being offered by the buyers. The buyers thinking the spinners were bluffing, and only trying to get a higher price withheld from the market as long as possible in the hopes of having the spinners concede a point, but they lost sight of the fact that the spinners have been fighting just such conditions for the past two years and are now determined to hold the power that they have at last got in their hands. Weavers and knitters were both short however and it was impossible to hold out of the market very long so that now the buyers are glad to give orders in order to obtain the deliveries they want. Spinners are refusing to take orders that will run their mills into October, and they are stipulating the prices at which they will take any orders. The yarn market is in the entire control of the spinner, who is now doing the dictating. Knitters are trying to place orders for yarns to supply their 1913 lines.

The cloth market has been more quiet than the yarn market during the month, though much the same conditions exist as in the yarn market. Brown cottons have been good all the month, with a greater demand now than has been the case for some time. Lines of fancies have also been in good demand, while prints have increased in value until they now hold the strongest positions in the market.

The Middle States Textile Manufacturers Association held its annual meeting at Louisville, Ky., on July 17th and the members present expressed themselves as pleased with the outlook, and the past several months. A number of valuable papers were read by prominent manufacturers and the same officers were reelected for the coming year. The most important feature of the meeting, was the adoption by the Association of the Carolina mill rules for buying cotton; the feature of which is the standardization of the percentage that shall be allowed for loss on the cotton bale for handling.

This month has been the regular semi-annual dividnd period, for a large number of the mills in South Carolina, and the number of mills which have participated in this, and the amount of the dividends that have been passed indicate that the mills of the South are in a very prosperous condition.

A resume of the mill building, reorganizing, additions of machinery, etc., will be of interest.

Mills chartered. The King Cotton Mills Corporation, of Burlington, N. C., has been incorporated to take over and operate the Belle Vue Mills of that place. The capital stock of the new corporation is $50,000. The Armstrong Cotton Mill Co., has been organized at Gastonia, N. C., by Col. C. B. Armstrong, with a capital stock of $200,000, and it is expected this mill will be ready for operation by the time the new crop comes in. The Coosa Mfg. Co., Piedmont, Ala., has matured plans for a mercerizing plant at Ridgedale, Tenn, which has now been equipped with machinery. The Lowell, (Mass.) Bleachery Co., will establish a plant at St. Louis, Mo. Avondale Mills, Birmingham, Ala., will build another cotton mill, though not at Birmingham; the new mill will cost about $600,000. The report that a cotton mill would be built by the Crystal Springs Bleachery Co., of Chicamauga, Ga., has been verified. Stewart Hosiery Mills, Newport News, Va., have been incorporated with a capital stock of $100,000. Prendergrast, (Tenn.) Cotton Mills have been incorporated at $100,000, this being a new mill. The American Hosiery Mills, Kernersville, N. C., have been incorporated with a capital stock of $125,000.

Reorganizations: Whitaker Mills, Blacksburg, S. C., have been adjudged bankrupt through the assets are greater than the liabilities; W. C. Hamrick has been appointed receiver. Senoia, (Ga.) Duck Mfg. Co., is the present name of the Senoia Duck Mills, which have been re-organized with a capital stock of $100,000. Parker Mills Co., of Greenville, S. C., has reorganized into three different companies, particulars of which will be noted in detail further on. Gilreath Mfg. Co., Greenville, S. C., has been sold for $2,300. The Trion (Ga.) Mfg. Co., were recently sold after having been bankrupt for some time past, for $600,000. Julliett Milling Co., is now the name of the company which has formerly been known as the Julliett Milling & Glovers Mfg. Co. Liberty, (S. C.) Cotton Mills, are now known as the Easley Mills No. 2. Cherokee Hosiery Mills, Rome, Ga., have been adjudged voluntary bankrupt. It is reported that the Textile Mills, at Wesson, Miss., will be sold soon, and a number of mill men have visited them for inspection. The Royal Mills, Charleston, S. C., have been granted a charter with a capital stock of $250,000 this being a reorganization of the Royal Bag & Yarn Mills.

Additions and Changes in Equipment: Texas Cotton Mills Co., McKinney, Tex., has increased capital stock

from $190,000 to $220,000 for the purpose of adding new machinery. Brandon Mills, Greenville, S. C., have added 10,000 spindles. Easily Cotton Mills No. 2 at Liberty, S. C., have added 12,000 spindles and 300 looms to their equipment. Ware Shoals (S. C.) Mfg. Co., are building an ell addition to the mill. Conestee Mills, Reedy River, S. C., are adding 3,000 spindles. Union Cotton Bagging Co., Norfolk, Va., has increased capital stock from $115,000 to $232,000. Ivey Mills, Hickory, N. C., have changed over their mill from fine numbers to coarse counts. Twine Mills Corporation, of Roanoke, Va., is expending about $50,000 for additional spinning machinery. Youngs-Hartsell Mills, Concord, N. C., are building 40x32 addition to the mill. Washington Mills, Fries, Va., are adding spindles. Denison (Tex.) Cotton Mills, are installing 2000 spindles and 50 looms. Vass (N. C.) Cotton Mills have placed contract for an addition of 1,440 spindles. Strickland Mills, Valdosta, Ga., will add new machinery amounting to 1,248 spindles. Sutherland Mfg. Co., Augusta, Ga., have changed over from a spinning to a weave mill, and have thrown out the spindles and placed in their stead 144 looms. Imperial Mills, Eatonton, Ga., are adding 7,000 spindles and 200 looms. Greenwood (S. C.) Cotton Mills have increased capitalization from $500,000 to $900,000. Danville (Va) Knitting Mills, are building 95x100 foot addition for finishing, etc. The addition to the Lancaster (S. C.) Cotton Mills will consist of 64,000 spindles and 1,500 looms. Milstead (Ga.) Mills will expend about $3,000 on a new building. The Princeton Mills, Salisbury, N. C., have let contract for the new building at that place at a cost of $6,000. Mary Leila Mills, Greensboro, Ga., are adding 6,000 spindles and 150 looms. Sanford (N. C.) Cotton Mills are adding 15,000 spindles. Harriman (Tenn.) Hosiery Mills have let contract for a new building. A new mill has been proposed for Richmond, Tex. Park Cotton Mills, LaGrange, Ga., have started up after being idle for several years.

The reorganization of the Parker Mills Co., which corporation controls sixteen mills in South Carolina, into three distinct companies has created quite an interest in Southern mill financial circles. The reorganization consists of the following companies: Victor Mfg. Co., of Greer, S. C., capital $3,500,000, including the Victor and Greer Mfg. Co., of Greer; Apalache Mills, at Arlington; Wallace Mills at Jonesville; and Ottaray Mills at Union. The Monaghan Mills, Greensville, capital $2,500,000, which includes the Monaghan Mills, Greenville; Seneca Cotton Mills, Seneca; Walhalla Mills, Walhalla. The Hampton Mills, of Columbia, capital $7,000,000, including the Olympia, Granby, Richland and Capital City Mills of Columbia; Pine Creek Mills at Camden; Beaver Dam Mills, Edgefield; and Wylie Mills, Chester.

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A report from a commercial agent of the Department of Commerce and Labor contains the information that a firm in Turkey would like to buy cotton waste, particularly motes, strippings, and flyings, and desires to communicate with American exporters of the same. Samples and prices c. i. f. Turkish port should be sent with first communications. The same firm also handles cotton goods and would like to hear from manufacturers of heavy sheetings, drills and ginghams. For further information apply to the Bureau of Manufacturers, Washington, D. C., and refer to file number 8855.

## NEW ENGLAND MILL SITUATION.

*(Special Correspondence.)*

A strike of weavers against the adoption of a grading system for paying wages in fine goods mills has caused the closing of twelve corporations plants in New Bedford thus cutting off the product of about 30,000 looms. The strike was inaugurated on the 15th inst and on the following day it was decided by manufacturers to close the mills tight and allow them to remain so for an indefinite period. The strike was induced by protests against what is regarded as a modification of the fining system in weaving rooms where fancies and fine cloths are handled. There are seven corporations in that city that do not approve of trying to enforce a grading system, and their mills, comprising 19,000 looms, are in operation.

The underlying grievance is an old one and has been fought by weavers for more than a quarter of a century, in the courts, in legislative hearings, and in the newspapers. Many manufacturers have long since abandoned the practice of fining, not that they recognize any right of operatives to resist graded pay for various classes of work, but because they are not convinced from experience that fining makes weavers better operatives, or is of importance enough to be permitted to become an endless source of friction. Fall River mills long since abandoned fining, and mills in many other places throughout New England have ceased to use it.

After the Supreme Court of Massachusetts declared a fining law unconstitutional the New Bedford manufacturers posted notices establishing two grades of wages, one 40 per cent below the other, the latter to be paid for inferior work. Immediately, the old established trades unions resented what they deemed to be an arbitrary method of reinstating the fining system which went out of use after the legislature of 1910 passed a law forbidding it. Thereupon, the I. W. W. came on the scene and caused riotous troubles in a quarrel that might have been peaceably adjusted, otherwise.

At this writing there is every prospect that the mills will be kept closed until after Labor Day at least. Belts have been slipped, weights have been removed from rolls, and other indications of a long shut down are to be seen. The fine goods trade is not in good shape and a curtailment of production through a strike or other means is certain to bring about a better balance in the markets of the country. The manufacturers contend that they are now fighting to see who will run their mills, the operatives or the owners, but it is patent that if market conditions were satisfactory, some way would be found for adjusting grievances that are not new and that must at some time or another be settled through a harmonious understanding between those who want to work and those who can supply work. The entrance of the I. W. W., into the controversy has been fought at every stage by the older established unions and the institution so foreign to American or English ideals will soon be crushed out in New Bedford, where a generally high class of labor is employed.

Aside from the unsatisfactory conditions in fine and fancy cottons, trade in merchandise produced in the New England cotton mills is very fair. Print cloths and convertibles from print cloth yarns have been particularly strong all month and have reached the highest price level

of the year. Sales of goods have been in excess of production, and production has been limited materially by a scarcity of labor that is common to all textile branches in all sections at this particular time of the year. The Fall River stock of print cloths and odd goods does not amount to two weeks output under normal conditions, and the mills are closely sold through September. Many contracts have been extended into the later months of the year. There is a remarkable scarcity of many semi-staples in print cloth numbers and all spots are picked up by buyers just as soon as they are offered.

At the end of the month there was a better demand for fine cottons and mills had advanced prices on plain numbers to a basis of 5¼ cents for 30-inch 88x80s, 11.35-yard goods, while advances varying from 1 to 2 cents per yard were named on goods of fancy construction or heavy weave, such as silk voiles, silk striped poplins, silk striped piques, crepes, and other fancies that are sought for the new spring season. In many instances these advances have been brought about by the effort to place contracts in the struck mills with other mills, but there has come with the strike a general realization among buyers that a scarcity of new spring goods may come about and become acute in November.

Prints were advanced by one printer in New Jersey for August 1st, but the New England printers are not yet ready to make a move. They are selling their full product and have yet many goods to deliver. The matter of moving up to 5½ cents for standard prints entails the possibility of a restricted consumption, particularly when so many other goods are still held at most attractive figures in the finished state. That an advance in prints will ultimately be forced to the higher level is generally believed by buyers as well as by printers. Gray cloths are on a basis of 4 cents for regular print cloths which does not leave a printing margin with discounts and terms to be provided for. The export trade in prints continues good and at the end of the month activity in narrow subcount print cloths was great.

The advance in bleached goods announced at the end of last month (June), to a basis of 8¼ cents for Lonsdale 4-4, was not followed by Fruit of the Loom. They are now held at value at 8½ cents to be charged at the price current in the market when the goods are ordered in. Subcount bleached cottons have been sold well and have been advanced to a basis of 6 cents for 4-4 64s.

Some lines of dress ginghams have opened for spring 1913 at the same prices as those current last season. This is true of Bates, Palmer and other lines. But the big Amoskeag lines have not been priced and are not likely to be for some weeks, possibly not until September 1st. Trade in dress ginghams in low counts has been good with some of the New England mills this year, but through a sacrifice of business on the lines jobbing around 9 cents. The problem ahead of the dress gingham manufacturers is one of distributing a normal output even without much of a leeway for profit and this outlook has not been seen for a long time. Staple ginghams, seersucker stripes, and chambrays for shirting purposes on the other hand are comfortably well fixed. Prices are close but the product is being taken and all the looms are busy.

Tickings, denims, fancy twills, duck, and chevoits for the working suit trade are in an excellent position. The mills are as well sold as they can be with the cotton market in its present position and with conditions promising high cotton for the balance of the season. The selling agents would readily sell much farther ahead if mills would consent. There is no dearth of demand and the only question is one of price, the mills feeling that sales on the present levels will not aid them unless the cotton outlook changes greatly in the next two months.

Pepperell drills are sold ahead through September. Many of the best known lines of branded brown goods, wide sheetings, etc., are under order through September and are at value in many instances, to prevent sales at losses for the late months of the year. Cotton crash, quilts, and fancy upholstery fabrics such as curtain scrim, etc., are very well under order and at profitable figures. Many of the selling agencies who now convert some part of the output of New England mills for use in the manufacturing trades have no fault to find with the volume of business coming in.

The extraordinary position of the many mills making cotton blankets, flannellettes, and similar merchandise for fall, is well illustrated in the case of the Tremont and Suffolk mills of Lowell. They use 1,500 bales of cotton a week. When the selling agents made up their inventory for the last week of July they returned to the mills a clean stock sheet, something that has rarely happened in the history of the corporation. The demand for merchandise of this character is in excess of the possible supply for many weeks to come and at this time it looks as if this part of the market will hold strong until the new season begins in January.

The bleacheries and finishing plants have been somewhat upset by the strike in the New Bedford mills. For the moment they are busy and the bleacheries in particular can find plenty to do. The advance of ½ cent a yard announced a few weeks ago for finishing many of the finer goods has been fully accepted in the trade. The Crystal Spring Bleaching and Dyeing Company at Assonet, Mass., has changed hands and will be renovated and refitted to finish fine cottons and fine silk and cottons. The printing department consisting of two machines will be abandoned.

The machinery men are beginning to get a larger measure of business. Much of it is coming from outside of New England and considerable of it is coming from mills already established. Prices are still in favor of buyers but the conditions prevailing in iron and steel, as well as in labor, makes it seem probable that advances will be enforced as the demand for new equipment broadens, as it now promises to do.

The possibility of tariff revision before April is not regarded seriously and some manufacturers express a willingness to guarantee buyers against lower prices up to that time. Nevertheless, the whole section is alive to the expectation of a most active tariff political campaign.

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An American business firm writes the Bureau of Manufactures that it has an inquiry from its agents in the Near East for cotton goods in short pieces, from 1 to 5 yards and from 5 to 10 yards. The communication states that the inquirers are in a position to dispose of any quantity. Firms interested in this proposition should correspond with the American house, quoting prices f. o. b. Smyrna. In applying to the Bureau of Manufactures, Washington, D. C., refer to file No. 8838.

## COTTON CROP CONDITIONS AND A REVIEW OF THE MARKET.

(*Contributed Exclusively to* COTTON.)

BY H. AND B. BEER, NEW ORLEANS.

The weather developments during the past month have been favorable over about one-third and unfavorable over about two-thirds of the cotton belt. All sections west of the Mississippi River made progress as result of favorable climatic conditions, but there was too much rain in the central and eastern portions of the cotton region, causing the plant to suffer further deterioration in the Mississippi Valley and South Atlantic states, except in the Carolinas perhaps, where fairly good weather was had. It is probable, therefore, that the next Bureau crop condition report, due August 2nd., will make a less favorable showing than did last month's condition report. The general idea is that August Bureau will report an average condition of about 76, which would compare with 89.1 last year and the ten year average of 80.6; last month's report was 80.4.

None of the damage reported is so great as not to be entirely recoverable with favorable weather during balance of the season. At any rate all large crops were made by summer rains, short crops by summer drouths. It is evident, therefore, that this crop will give a good account of itself later in the year. The trouble this year is that the crop made a late start owing to the rains in the spring, made slow progress thereafter on account of cool nights and rains in June, and was further handicapped by the rains continuing in the eastern half of the belt during the first three weeks in July. Of late, however, the weather has cleared, and although fair weather has been had only the last few days, reports from the interior denote improvement in general conditions already, but too late to affect the next Bureau report to any extent, as returns to the government are sent in on the 25th. of July. If a stretch of good weather is had between now and August 2nd., the date of the next Bureau report, it is probable that allowance will have to be made for the improvement attained between July 25 and Aug. 2, which would have to be considered in forming conclusions.

At the moment the best of crop reports come from the Carolinas, Oklahoma and Texas, the latter state being the one bright spot in the belt. The worst reports are received from states in order named: Georgia, Mississippi, Alabama, Tennessee, Arkansas and Louisiana.

As to the probable future course of the market after the August 2nd. Bureau report is out of the way, will say that the chances are that it will be downward, especially if anything like favorable weather is had, as the crop suffered heavy deterioration in past years during the month of August, having lost 16 points last year. This year the crop will enter the month of August with a low condition, but any change during next month is apt to be for the better, and it is probable that this year's crop will be improving at a time when the crop of previous years, especially the crop of one year ago, was deteriorating. Under the circumstances we entertain every hope of this year's crop being a good one, present reports to the contrary notwithstanding, as it will not be a hard matter to make nine million to ten million bales of cotton outside of Texas, because 11,812,000 bales were made outside of Texas last year. In other words 1,812,000 bales could be lost outside of Texas this year, and yet 10,000,000 bales would be made, and as there is every assurance of Texas making a bumper crop this year, possibly 5,000,000 bales compared with 4,297,000 last year, a total crop of 15,000,000 bales would be within the bounds of reason.

According to the final Census Bureau report for this season, 16,109,000 bales were ginned this season from the growth of 1911, of which 556,000 bales were linters. This season's actual consumption will hardly be more than 14,000,000 bales of American cotton, which will leave a surplus, visible and invisible, of about 4,000,000 bales, against 2,000,000 last year, and if this year's growth should be 15,000,000 bales, it will provide a supply of 19,000,000 bales compared with 18,000,000 the past season. But there are many people who believe that this year's crop will be less than 13,000,000 bales, which accounts for the present high level of values.

## THE KNIT GOODS MARKET.

The knit goods market for the past month has shown satisfactory returns on both sides of the business. Underwear lines are generally well sold up for spring and the buying was in marked contrast to a year ago. Duplicate orders for this season have also been in good volume and the hosiery business has shown itself extremely active. Several lines of underwear have been withdrawn from the market and at least one well known line of hosiery. The production of these mills for next spring have been sold up. Other mills have reported that they were getting to a point where they have about as much business as they can handle at the present time and at the present range of prices. There were a few weak spots in low end balbriggans but the higher grades have also been contracted for by buyers in a volume that is fully satisfactory to the manufacturers. The hosiery trade is even more joyful over the buying for spring to date than are their friends in the underwear market. A number of lines are reported to be well sold up and prices are said to have been advanced in some lines of low end goods from five to ten cents a dozen. Another feature is the large amount of business coming in for immediate shipment showing the short conditions of stocks in hand.

The opening of the month brought in light initial orders in underwear lines, and reports from hosiery salesmen seemed to indicate business to be developing slowly. Prices were holding fairly firm although some of the best sellers were priced at slight advance when the season opened. At that time much seemed to depend on the cotton yarn market for if there had been a serious break it might have had considerable effect on the knit goods trade. There was quite an increase in the demand for union suits during this period, but the quiet business effect of the fourth of July holiday is always felt at this time.

The semi-annual meeting of the Jobbers Association of Knit Goods Buyers was held at the Waldorf Astoria, beginning July 8th. The session was a short one and all of the business that came before the members was disposed of quickly. The next few days after the meeting showed considerable increase in business owing to the fact that many of the members had been waiting until this time to cover their requirements for the next light weight season. In addition to orders on low priced balbriggans, further lines of 50 cents goods were opened up and a fair business

put through. On these better grade lines buyers had shown a preference for bleached yarn goods, rather than those made from a darker shade of Egyptian yarns. The balbriggan demand improved to quite a marked extent, during this period. Ribbed vests in women's garments came in for as much attention as the balbriggan lines. Buyers placed fair orders in several quarters, although prices were somewhat irregular. Union suits to retail at a $1.00 had the heaviest call in this line of underwear. Hosiery lines showed improvement and business for the latter part of the month was looking to be in very comfortable shape.

As the month closes, hosiery buyers are extremely active and operations in the primary market are large. Initial buying in the underwear market is practically over and selling agents report early business unusually heavy. About the heaviest demand so far this season are on the 25 cent balbriggan lines. Manufacturers are well sold up and in many cases have completely withdrawn from sale for the balance of the season. Manufacturers of union suits have been in receipt of what many term, the heaviest initial business in the history of the trade. Demands for goods of this description have been steadily increasing during the past two or three seasons and the output has failed to keep pace with it. On hosiery lines for next spring, the demand has been and continues decidedly active. Several well known lines have been withdrawn from the market, either owing to the fact that the mills are well sold up or because the manufacturers are unwilling to accept further business at current price levels. The demand is more strong on better grade goods and buyers are having considerable trouble in covering their needs on full fashioned hosiery in women's lines. Taken as a whole it was the most satisfactory month the knit goods manufacturers have had in a long time.

## THE YARN MARKET.

The yarn market for the month has been a comparatively inactive one. Spinners prices however are still held up rigidly and there seems little indication of softening in these prices. The advance in the raw cotton market caused the spinners prices to harden a little, but beyond that it had no immediate effect. Buyers refused to be frightened by the rising raw material prices as they believe that later in the season the price will go back somewhat.

The opening of the month showed little new business and the bulk of transactions being for spot or nearby delivery with a small volume. Inquiries were coming in from knitters for future delivery but no agreement was made on prices. Combed yarns remained strong and takings of the weavers were quite small. Some dealers saw prospects for a let-up in European business activity with consequently reduced demand for American cotton. There was a fair demand for mercerized yarn during this period. As the month wore on more inquiries came forward for spot lots and prices hardened somewhat. Some counts advanced from one quarter to a half a cent a pound. At a meeting of the Southern Hard Yarn Spinners Association resolutions were passed agreeing to close down during the summer months unless orders actually on hand warranted the mills being kept in operation. Some of the mills have sufficient orders on their books to keep their plants running well through into the fall months, while others have orders on their books for the next 30 or 60 days. In any event it was practically understood that there would be no cutting of prices in order to secure business to keep spindles going. It was reported during the middle of the month that many knitters were in need of yarn and numerous inquiries were coming to hand with also some offers, but the spinners were very firm in refusing to change their prices in the least.

As the month closes, dispite light demands, combed yarns are holding very firm. Weavers generally are covered until October, Eastern spinners are reported to be well sold up. The great question agitating the buyers at the present time is whether or not yarns are a purchase at present prices. In any case it looks like a spinners market for some time to come. Reports received from several important spinning sections are to the effect that the mills are not making up yarns for stock but are operating their plants only on actual contracts. Also nearly all mills have a certain percentage of their machinery idle, owing to the desire on the part of the operatives to take summer vacations or a few days of rest. Labor difficulties in other places are keeping goods off the market and this action will probably result in higher prices later on.

The New York quotations at the close of the month were as follows:

SOUTHERN SINGLE SKEINS.

| | | | |
|---|---|---|---|
| 4s to 8s | 17 @17½ | 22s | 20½@21 |
| 10s to 12s | 17½@18 | 24s | 20½@21 |
| 14s | 19 @-- | 26s | 21 @21½ |
| 16s | 19 @19½ | 30s | 25 @25½ |
| 20s | 20½@-- | 40s | 31½@32 |

SOUTHERN TWO-PLY SKEINS.

| | | | |
|---|---|---|---|
| 4s to 8s | 17½@18 | 36s | 34 @-- |
| 10s to 12s | 18½@-- | 40s | 35 @-- |
| 14s | 19 @-- | 50s | 44 @-- |
| 16s | 19½@20 | 60s | 48 @-- |
| 20s | 21½@-- | 3-ply 8s upholstery | 18½@-- |
| 24s | 22½@23 | 4-ply 8s upholstery | 18½@-- |
| 26s | 23½@24 | | |
| 30s | 25½@26 | | |

SOUTHERN SINGLE CHAIN WARPS.

| | | | |
|---|---|---|---|
| 10s to 12s | 18½@19 | 24s | 22 @-- |
| 14s | 18½@19 | 26s | 22½@23 |
| 16s | 19½@20 | 30s | 25 @25½ |
| 20s | 21 @-- | 40s | 33 @-- |
| 22s | 21 @21½ | | |

SOUTHERN TWO-PLY CHAIN WARPS.

| | | | |
|---|---|---|---|
| 8s to 10s | 19 @-- | 26s | 25 @-- |
| 12s to 14s | 19½@-- | 30s | 26 @-- |
| 16s | 21 @21½ | 40s | 35 @36 |
| 20s | 21½@22 | 50s | 44 @-- |

SOUTHERN PEELER FRAME CONES.

| | | | |
|---|---|---|---|
| 8s | 18 @-- | 18s | 20½@-- |
| 10s | 18½@-- | 20s | 21½@-- |
| 11s | 18¾@-- | 22s | 22 @-- |
| 12s | 19 @-- | 24s | 23 @-- |
| 14s | 19½@-- | 26s | 23½@-- |
| 16s | 20 @-- | 30s | 24 @-- |

A business man in France having connections with spinning mills in that country informs an Americen consulate that he is desirous of entering into direct relations with some large cotton grower or broker in the United States for the purpose of selling bale cotton, as he wishes to operate independently of European commission agents. He believes he can dispose of 40,000 to 50,000 bales of cotton a year. He states that he has ample references and can correspond in English. The consul is of the opinion that this is an excellent opportunity and hopes that some satisfactory arrangement can be made for simplifying the direct importation of raw cotton into that district. For further information apply to the Bureau of Manufactures, Washington, D. C., and refer to file No. 8835.

# COTTON MANUFACTURING.

## LOOM BREAKAGES, THEIR CAUSES AND REMEDIES.

(*Contributed Exclusively to* COTTON)

BY T. WOODHOUSE AND A. BOROCCO.

Among the many accidents which may arise in power looms there are perhaps none which happen more frequently and with more annoyance than that of the breaking of driving wheel teeth. In order to repair such accidents quickly, or to replace well worn wheels, it is necessary to keep a stock of these driving wheels; such a stock naturally depends upon the frequency of accidents in the factory, and the frequency depends largely upon the class of work, the quality and make up of the wheel, and upon the operatives. The introduction of new teeth in the wheels to replace the broken ones gives only partial satisfaction, since the weakness of a wheel is proportional to the number of repaired places, and, consequently, the wheels are less able to withstand the work at these repaired places. It is important, therefore, to diminish as far as possible the necessity of keeping a large stock of wheels, as well as the necessity of stopping looms for such repairs. This question is clearly one which the mechanic, the foreman, or both, should take into consideration, and his or their attention should be directed to try and ascertain the causes which are often difficult and sometimes well nigh impossible to detect.

When a driving wheel is broken it is either replaced by a new wheel, or the broken one is repaired by inserting new teeth at the damaged part; the loom then continues to run as before subject to the same danger unless those in command find out what caused the accident, or attempt to make alterations which will help to prevent further breaks. It is certainly much easier to ascribe the accident to the bad quality of the casting, or to the defective composition of the wheel, than to search for the cause; but although both these defects may obtain, it is the duty of the head mechanic to examine those parts of the loom which may help to accentuate the danger. If the cause of these sudden and unexpected breakdowns is known, it should be a comparatively easy matter to prevent a further occurrence of them, and we have little hesitation in stating that such accidents will be very rare, and may almost be unknown in a factory which is under the personal superintendance of a conscientious, capable, and experienced foreman.

The chances of rapid wear or of a sudden break is evidently much less in a narrow light loom than in a wide loom such as those which are used for the manufacture of wide sheeting, awnings, linoleum backing and similar wide fabrics, or for the heavy narrow looms in which sailcloth, heavy jute carpets, belting and the like are woven. In these massive looms the least fault in the setting of the parts may lead to an irregular movement, and perhaps to a breakdown. In such heavy looms and indeed in all looms it is of the utmost importance that all causes of shocks or vibrations should, if possible, be removed. The reader will easily understand that a shock which occurs every revolution of a loom acts as a series of blows on the same tooth of the wheel, and ultimately results in breaking it.

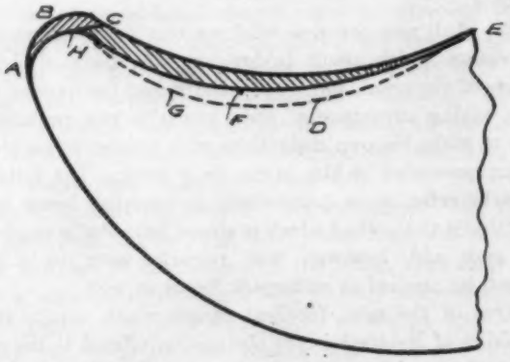
An essential point to observe in the setting of a loom is that of obtaining an elastic movement without the annoyance of any shock or blow. If this statement is of importance with respect to the general motions of the loom, it is of the utmost importance with respect to the picking motion, to the imperfect movement of which, it is agreed, many breakages are due. Every part which hinders the perfect motion of the loom should be dispensed with if at all possible.

We shall now mention what we consider to be some of the causes which result in breaking the teeth of driving wheels of the crank and wyper shafts, and the fixer or foreman, taking advantage of these remarks, will probably be able to make his own deductions with respect to such cases as are presented to him in his daily work. The following remarks refer, more particularly to overpick looms seeing that this is the method which is almost universally employed; we may add, however, that remarks may, to a great extent, be applied to underpick looms as well.

One of the most frequent causes which results in the breaking of the teeth is the obstruction offered to the movement of the picker along the box spindle. It may happen that a great number of leather rings are placed on the box spindle to act as a buffer or stop to the advancing picker. If the number of these rings is such as to prevent the free and full movement of the picker it is evident that the picking wyper will receive a shock which will be transmitted to the teeth of the driving wheels. This shock will be augmented in proportion to the power transmitted by the increase of leverage between the picking stick, the cone, the picking wyper and the wheel. It very often happens that the foreman or fixer, with a commendable effort of effecting an economy in leather, uses old pickers as buffers. It is evident that the tendency to accidents will be increased by the employment of such hard material for buffers, since there is practically no elasticity in these pickers, whereas leather rings, although not perfect, provide a kind of cushion which reduces the impact all round. In looms from 60 inch reed space upwards, it is customary to abstain from such a practice under the errenous idea that a greater saving results in preventing the breaking of picking straps than in trying to prevent broken teeth. Even with the most careful adjustment of the various parts the wear and tear on the teeth of the driving wheels is greatest at those points which are in contact when picking takes place; the wheel teeth get worn and weakened at these points so that it is advisable to move the wheels slightly from time to time so as to prevent worn teeth coming together at the moment of picking. Similar dangers to the above exist in underpick looms, indeed the dangers are if anything, increased by the possibility of the picker, which moves in an arc of a circle, becoming entangled or jammed in the guide slots.

A second cause which may result in broken teeth is the imperfect shape of a repaired picking wyper point. When from continual use the outline of the point of the picking wyper becomes so worn that it is necessary to alter its shape, it happens that the mechanic or perhaps the fixer, in place of substituting a new picking point, chips and files the old one to what he considers the correct form for imparting an easy movement to the picker and shuttle. Perhaps by negligence or other reasons the point of the wyper is

filed until it assumes an imperfect shape. Consider, for example, Fig. 1, the curves a, b, c, e and a, h, f, e represent the original theoretical outlines. The part a, b, c, a is that part which gets worn away by constant use. When this happens it is necessary to chip and file the point until it assumes a shape somewhat similar to the original one. If it is filed out, as is often the case, until it is shaped as represented by the curve a h g d e the effect would be a harsh pick; the hooked form would impart a quick movement to the cone, and would not give that uniformly accelerated motion so desirable in picking motions. The movement




would be more of the nature of a blow, and the breaking of the driving wheels would not be long delayed under such conditions.

A third cause of breaking arises from the shuttle being held too firmly at the far end of the box. Many fixers have the habit of having the entrance to the box too wide, so that the far end of the box is too narrow. Although the entrance should be wide enough to admit of an easy entrance for the shuttle, this should not be overdone, for all things considered the most favorable disposition of the box is that where the box back and the box front are nearly parallel. In addition to the danger of breakages, the shuttle will have a tendency to move towards the weaver instead of into

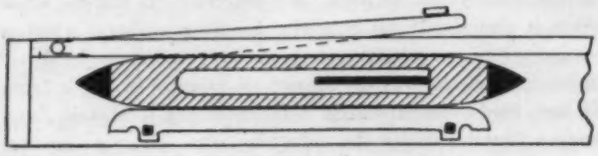


FIG. 2

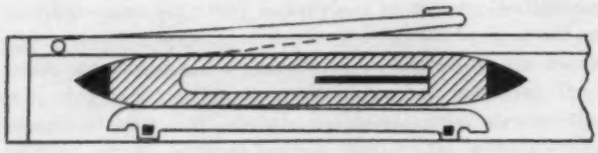


FIG. 3

the box if the opening of the box is too wide. Figs. 2 and 3 show both good and bad positions of the box front with respect to the box back.

A fourth cause of breaking the driving wheel teeth is the result of a bad relation between the relative positions of the picking wyper and the crank. Figs. 4 and 5 show the relative positions of the parts under the best conditions. Fig. 4 is the arrangement where the loom beats upwards and Fig. 5 where the loom beats downwards—the direction of motion of the crank shaft as well as the wyper shaft is indicated in both cases by the arrows. It will be seen that when the point of the picking wyper is in contact with the cone the crank should, for upward beat looms as in Fig. 4, form an angle of about 45 degrees with the vertical, while for looms with a downward beat the crank should be about 28 degrees past the bottom centre; in both cases the shuttle race is in precisely the same position, and consequently the shuttle can enter the shed as easily in one case as in the other. The difference in the position of the crank is due to the difference in rotation. With an arrangement such as is indicated in Figs. 4 and 5 we should have, at the moment when the shuttle was leaving the box, the picking stick and the lay in the positions indicated in Fig. 8. As the reader may easily verify, the picking strap moves, under these conditions, almost parallel to the box. The shuttle will therefore move out smoothly without a jerk, and without being thrown out. The movement of the loom will therefore be satisfactory.

If instead of the crank being at 45 degrees to the vertical as shown in Fig. 4, it is placed at 60 degrees when the picking point and cone are in direct contact as shown in Fig. 6 for an upward beat loom, and 42 degrees past the bottom centre for a downward beat loom as in Fig 7, we see that the lay will be further back when the shuttle is leaving the shed. The end of the picking stick is naturally further from the box, the relation between the two points being somewhat as illustrated in Fig. 9. The picking strap, instead of being directed more or less in the direction of the lay, will point outwards as illustrated by the arrow. A shock will naturally result in consequence of the oblique pull which is exercised on the box spindle. The shuttle will with difficulty, be forced out of the box, and the extra travel of the lay results in quicker movement to the picker and usually a harsher pick.

For each revolution of the wyper shaft there are two blows given to the shuttle, and these blows give shocks to the driving wheels, which, sooner or later get broken. It is evident that the whole loom will suffer under these conditions, and consequently the foreman should see that the cranks are correctly set so that when the shuttle is propelled the shock will be as slight as possible.

When the weft is in the form of cops, which is usually the case for jute and for many types of linen, it is necessary that the cops should fit closely and firmly in the shuttle, so that the weft may be withdrawn as required without removing the cop bodily from its position. To secure this favorable arrangement it is clearly essential that the cop should be of such a diameter that pressure is necessary to force it into its position in the shuttle. The cops are sometimes a little too big, and the weaver, after having introduced the cop and fastened down the lid, is obliged to give the latter a blow on the breast beam. If this operation is omitted the shuttle may have some difficulty in passing through the shed and of entering the box; the result is that the loom hangs or knocks off, that is to say the protector is not raised by the time the tongue reaches the frog, and consequently the two parts come into contact and the loom is suddenly stopped. The sudden stoppage of the loom in this manner sometimes results in broken swords, and it is evident that the blow will also be transferred to the driving wheels which may also be damaged. The danger through this source may be avoided by seeing that the shuttles are perfectly grooved and that the cops, while large enough to prevent bodily slipping, do not stand too high in the shuttle.

Swords are often broken when the fabric is extra heavy;

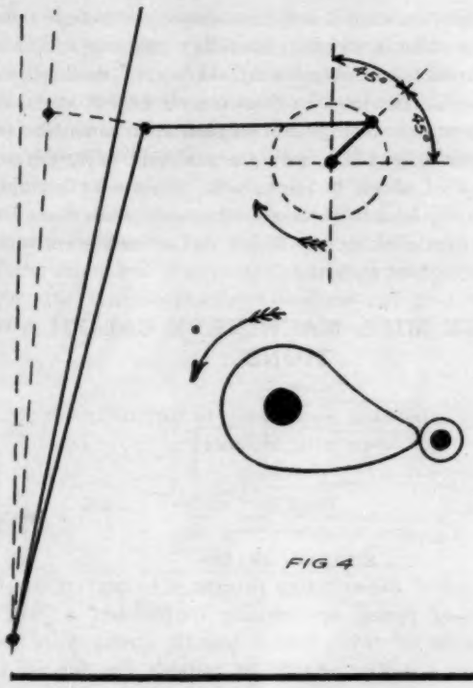



FIG 4

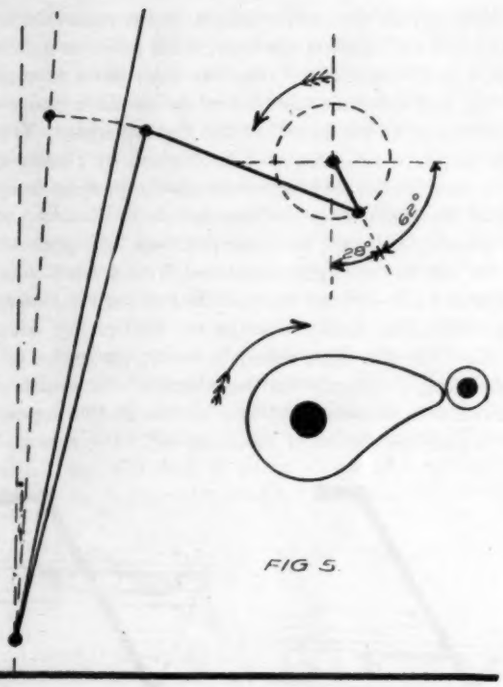



FIG 5

indeed, not only swords, but cranks and even reeds are broken in the weaving of very heavy fabrics. The only means of preventing such occurrences is the adoption of heavy looms and reeds to suit the particular purposes. Although an ordinary loom may weave a wide range of cloths, it is unreasonable to expect it to be suitable for all grades—the lighter and heavier fabrics may and often do require light and heavy looms respectively.

We have already shown that the time of picking, or at least when the shuttle leaves the picker, is about 45 degrees past the top centre in Fig. 4 and 28 degrees past the bottom centre in Fig. 5. If this time be delayed much beyond this point, say the points indicated in Figs. 6 and 7, there is not only the dangers already mentioned, but also the danger of the shuttle being too late in its arrival at the opposite end of the loom. With late picking the shuttle would certainly have the larger shed for its entrance, but its time of arrival in the opposite box would probably lead to knocking off with the consequent injury to swords, tongue, frog and wheels. Occasionally a weaver wishes to stop her loom quickly, and to do so she pulls forward the picking arm and thus arrests the shuttle before it enters the box. The loom, if in good order, naturally knocks off, and a constant recurrence of this mode of stopping the loom inevitably results in broken parts. This method cannot be too strongly condemned.

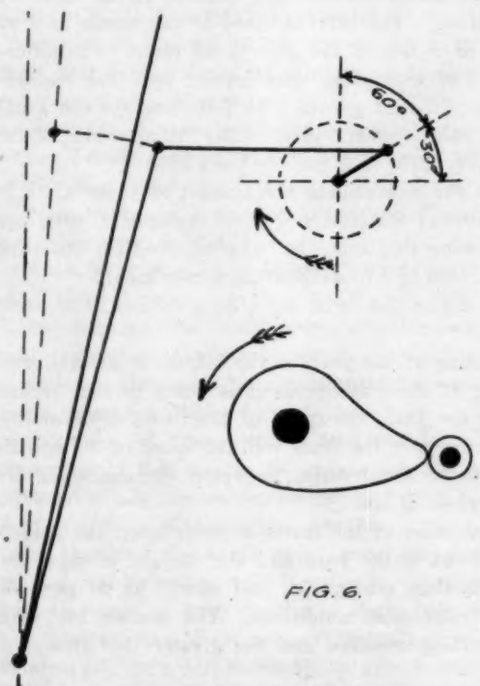



FIG. 6.

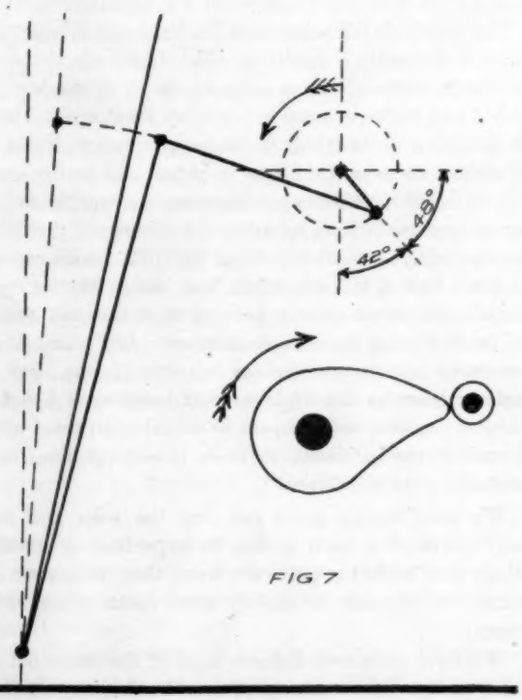



FIG 7

Although the time of picking, so far as regards the action of the picking point on the cone, takes place as indicated in Figs. 4 and 5, the actual time for the shuttle to commence moving, and therefore the time of its entrance into the shed is influenced by the length of the picking strap. The minimum length of strap required is obtained by placing the lay on its back centre and then rotating the picking strap until it is at right angles to the shuttle box. When the lay and the picking stick are in these positions, the picking strap should not be too tight, otherwise it will tend to lift the picker and also to bend the spindle and perhaps offer excessive obstruction to the passage of the picker along the spindle. On the other hand, however, the strap must not be too long, or clearly the movement of the shuttle will be delayed with a consequent late arrival at the opposite end and a possible chance of knocking off. We assume in our

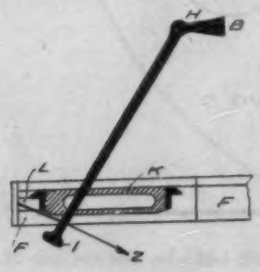



FIG. 8.

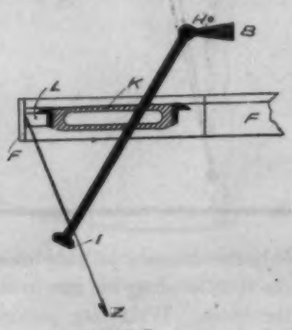



FIG. 9.

remarks concerning the length of strap between the picker and the picking stick that the picking point, cone and stick are already set in what appears to be satisfactory positions. It is evident that a slight movement of any of these will affect the work done by the picking strap, as well as the times of starting and arrival of the shuttle.

The use of shuttles of different weights is to be guarded against, for the power or pick required to send a heavy shuttle across the lay is not sufficient for that of a light shuttle. If the force is correct for the heavy shuttle, then knocking off will take place when the light shuttle is used.

The knocking off occasioned by irregular driving of the engine is obviously a condition which is outside the work of the tenter, although it is very likely to cause him much trouble and perhaps cause expense by breakages. The sudden stopping or starting of heavy machinery driven from the same source as the looms is certain, in many cases, to have an injurious effect upon the running, and the only safe way in such cases is to separate the driving of the different rooms, shafts, or machines from that part which causes the trouble. Indeed this has often been done, for the developments in electrical driving have already resulted largely in line shaft driving by individual motors, and where financial reasons do not form a serious objection, the individual machine drive by motors is making headway. Apart from financial reasons, with respect to initial equipment and cost of current, the individual drive is, in our opinion, the most satisfactory of all drives.

We need hardly point out that the wear and tear of many parts of a loom is due to imperfect or insufficient oiling; that when the parts are worn there is a more or less jerkey motion and ultimately some part gives away or breaks.

We have enumerated above most of the principal causes which lead to the breaking of swords, driving wheel teeth, etc., and as may be seen, it is always possible to reduce their number by a strict oversight. Smoother running with less danger of breakage is obtained by the use of machine cut driving wheels. The teeth in these wheels have a cycloidal shape which permits them to roll on each other almost noiselessly and perfectly. The teeth are perfectly adjusted and the tendency of shock is minimized. Such easy running wheels naturally lead to an increased speed, greater production, and fewer breakages, and also run several years without the least sign of fatigue.

## COTTON MILL MACHINERY CALCULATIONS.

(*Contributed Exclusively to* COTTON).

BY B. M. PARKER.

PART XVII.

### SPINNING FRAMES.

The object of the spinning process is to convert one or two strands of roving by reducing its size and adding a certain amount of twist, into a smooth, strong yarn and putting it on a bobbin or quill of suitable size for use on the machines following. The reduction in size is accomplished by the action of three lines of steel fluted drawing rolls with leather covered top-rolls and the twisting and winding is accomplished by the revolutions of the spindle and traveller.

The amount of draft used varies greatly, depending upon the requirements of the case and the ideas of different individuals. The average draft used can be stated as being eight when using single roving and ten when using double roving. These figures are neither too high nor too low and will, under most conditions, produce good, even drawing and give a smooth, strong yarn.

The amount of twist put into the yarn depends upon its size and the purposes for which it is intended. Warp yarn, on account of the strength desired, requiring more twist than filling. The twist is based on the square root of the number or counts of the yarn in all cases. The different multiples or multipliers used depend upon the requirements of the different yarns. The following are the usual multipliers used: warp yarn, 4.75; filling yarn, 3.25; doubling yarn, 2.75; and hosiery yarn 2.50.

The rule for determining the amount of twist is:

*Square root of the counts* $\times$ *twist multiple* = *twist per inch.* Following this rule, the twist required for 36s yarn would be: $\sqrt{36} \times 4.75 = 28.50$ turns per inch.

For 36s filling, the twist is: $\sqrt{36} \times 3.25 = 19.50$ turns per inch.

The winding of the yarn on the bobbin is accomplished by the drag of the traveller as it is being carried around the ring by the yarn, the speed of the traveller depending upon the delivery of the front roll, the speed of the spindle and the size of the bobbin, its speed decreasing as the bobbin increases in size.

The production of the frame depends upon the spindle speed, the twist in the yarn and the amount of time consumed by doffing, oiling, etc., and should be 90 per cent and over, under most conditions. The coarser the yarn, the more doffing required and the greater the amount of time lost.

The draft gearing of the majority of spinning frames is

so alike in arrangement that one diagram will be sufficient for our purposes. The gearing is placed at either the head end or foot end of the frame, the head end gearing being the best arrangement as it relieves the tin drum of the strain of transmitting the power necessary to drive the rolls and the traverse motion. Fig. 41 gives a diagram of the draft gearing of a spinning frame. The front roll is 1 inch in diameter and the middle and back rolls are ⅞ inch in diameter. The larger gear of 108 teeth on the end of the front roll is part of the twist gearing, being driven from the cylinder shaft. The front roll gear of 30 teeth drives the crown gear of 120 teeth. On the stud with the

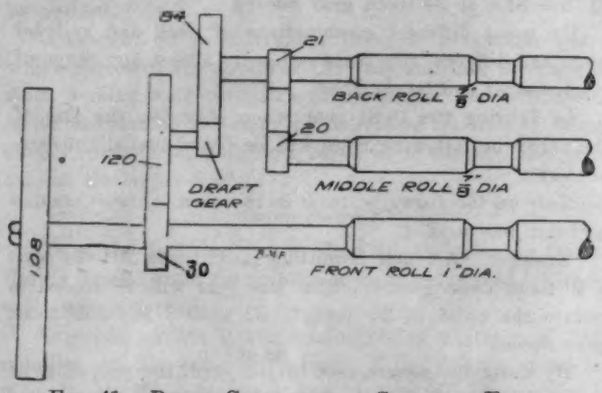



FIG. 41. DRAFT GEARING OF A SPINNING FRAME.

crown gear is the draft change gear which drives the 84 tooth gear on the back roll. This gives a draft factor of:

$8 \times 120 \times 84 \div 30 \times X \times 7 = 384.$

*Factor ÷ draft = gear. Factor ÷ gear = draft.*

Then, with a 38 tooth draft gear on, we would have the following draft: $384 \div 38 = 10.1$ draft.

The draft between the middle and back rolls ,or back draft, is small, being usually about 1.05, as in the above diagram.

The total draft divided by the back draft gives the front draft $10.1 \div 1.05 = 9.619$ front draft.

For small changes in the size of the yarn the proper draft gear can be found by calculations similar to the ones given on the fly frames.

Example. A spinning frame is making 36s yarn with a 38 tooth draft gear on, what size draft gear will be needed to give 32s yarn?

*Rule, Gear on frame × counts on frame ÷ counts wanted = gear needed.*

Then $38 \times 36 \div 32 = 42.7$ or 43 tooth draft gear needed.

In changing the draft gear from the weight of the yarn, the following rule holds good:

*Gear on the frame × weight wanted ÷ weight on the frame = gear needed.*

Example. A frame with a 40 tooth draft gear is delivering yarn that weighs 54 grains per 120 yards, what size gear will be needed to change the weight to 50 grains? $40 \times 50 \div 54 = 37$ tooth gear needed.

In changing the draft gear from the draft of the machine, the following rule is correct: *Gear on frame × draft on frame ÷ draft desired = draft gear needed.*

Example. If a draft gear of 38 teeth gives a draft of 10, what size gear will be needed to give a draft of 10.75? $38 \times 10 \div 10.75 = 35.3$ or 35 tooth gear.

In figuring the actual draft from the weight of material back and front, the following rule holds true: *Weight on back × doublings ÷ weight on front = actual draft.*

In figuring from the counts or size, use the following rule: *Counts on front × doublings ÷ hanks on back = actual draft.*

In dealing with draft on the spinning frames a peculiar fact presents itself, that is, the actual draft, as figured from the weight of roving and yarn, is less than the figured draft, as obtained from the gearing. This is explained by the fact that while the yarn is being twisted, it contracts in length and this contraction increases its weight, hence, the roving has to be drafted an additional amount to overcome this heavying up while twisting. Thus, if a frame is spinning 30s yarn from 6 HR doubled, the actual draft is: $30 \times 2 \div 6 = 10$. Now, if we calculate the draft from the gearing, we will find it to be about 10.3, or an increase of about 3 per cent, which is the amount of yarn

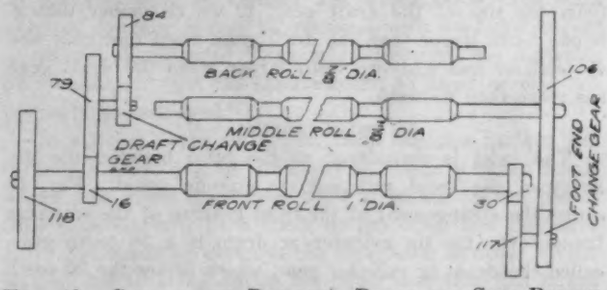



FIG. 42. GEARING OF DRAWING ROLLS ON SACO-PETTEE SPINNING FRAMES.

contraction due to twisting. So then, any calculation for draft, made from the weight or size of the yarn, must have the result increased about 3 per cent in order to get the correct figured draft, or size of draft gear necessary to put on the frame. If the draft is figured from the weight of the material, the easiest way of allowing for this contraction is to deduct it from the weights of the finished yarn on the front, getting, what we may term, the weight of the yarn before twisting, as follows:

30s yarn weighs .2778 grains per yard.

$.2778 \times .97 = .2694$ grains before twisting.

6 HR weighs 1.388 grains per yard. Then, $2 \times 1.388 \div .2694 = 10.3$ draft.

Fig. 42 shows a diagram of the draft gearing of the Saco-Pettee spinning frame, the only case in which the draft gearing is not arranged as shown in Fig. 41. The front roll drives the back roll by a train of gearing similar to the one shown in Fig. 40 but, instead of the back roll driving the middle roll, the middle drill is driven from the front roll by a train of gearing similar to the one driving the back roll, being located at the opposite end of the frame. This calls for the use of two change gears and necessitates two calculations to get the correct gears to use.

The draft factor for the total draft is figured as follows: $8 \times 79 \times 84 \div 16 \times X \times 7 = 474$ factor for total draft.

*Factor ÷ draft = gear. Factor ÷ gear = draft.*

Following the gearing at the other end, we find the factor for the draft between the front and middle rolls, or front draft, to be:

$8 \times 117 \times 106 \div 30 \times X \times 7 = 472.46$ factor for front draft.

*Rule. Factor ÷ change gear on foot end = draft between front and middle rolls.*

If we take the total draft and divide it by 1.05, the amount of draft desired between the middle and back rolls, we get the front draft. Divide the factor for front draft by the draft wanted and we get the proper change gear to use at this point.

Example. With above gearing, what draft gears would be necessary to give a draft of 10.3? Head end draft gear figured as follows: $474 \div 10.3 = 46$ tooth draft gear.

Foot end change gear figured as follows: $10.3 \div 1.05 = 9.8$ front draft. $472.46 \div 9.8 = 48$ tooth foot end change gear.

In the above arrangement, any change made in the total draft, affects the back draft and the break draft is the one occurring between the middle and back rolls.

There is no absolute necessity of making the calculation for the foot end change gear, as its size can be determined from the size of the draft gear, if we remember that it is one tooth larger than the draft gear when that gear has 45 teeth or less and two teeth larger when the draft gear has more than 45 teeth.

### TWIST GEARING.

The twist is considered as the ratio between the delivery of the front roll and the spindle speed. Fig. 43 shows the arrangement of the twist gearing of the spinning frame. On the tin cylinder or drum is a 30 tooth gear, called the drum or cylinder gear, which drives the 90 tooth jack or stud gear. On the stud with the jack gear is the twist gear which drives to the front roll gear of 118 teeth, using one intermediate in one drive and two in the other, thus giving both drawing rolls motion in opposite directions. The cylinder is 7 inches in diameter and the whorl of the spindle is ⅞ inch in diameter. As the ratio between the diameters of the cylinder and whorl is not the ratio between their speeds, we cannot use the two diameters, but have to use a ratio which is supposed to represent the number of revolutions the spindle makes for every one of the cylinder under working conditions. This ratio is given as 7.25 for the two diameters used above and is figured so as to make necessary allowance for band slippage, etc.

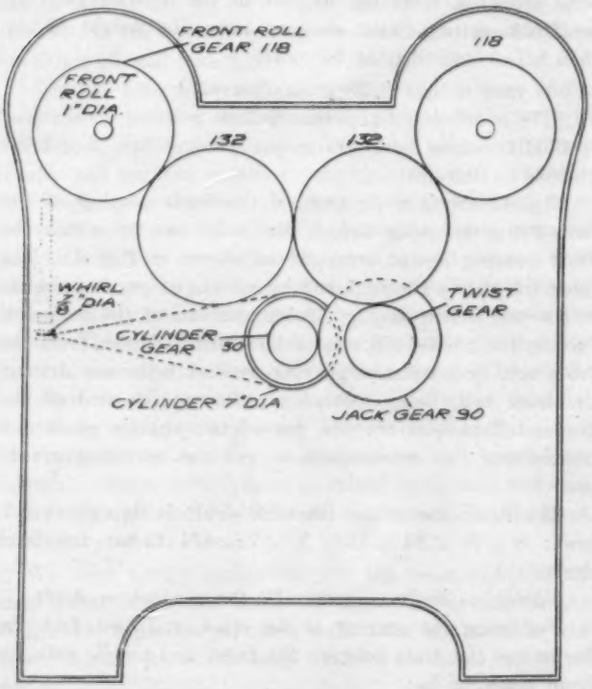



FIG. 43. GEARING END OF A SPINNING FRAME SHOWING ARRANGEMENT OF TWIST GEARING.

The front roll is 1 inch in diameter or 3.1416 inch in circumference and the twist factor is found as follows:

$118 \times 90 \times 7.25 \div 3.1416 \times X \times 30 = 817.36$ twist factor.

*Factor ÷ gear = twist. Factor ÷ twist = gear.*

Example. With the above twist factor, what size gear would be necessary if you wanted to run 25s warp yarn? $\sqrt{25} = 5$, $5 \times 4.75 = 23.75$ turns of twist; then, $817.36 \div 23.75 = 34.4$ or 34 tooth gear needed.

By using different combinations of jack and cylinder gears and different size front roll gears almost any range of twist desired can be obtained.

In figuring the twist gear when changing the size of the yarn, the following rules will be found useful and convenient:

*Gear on the frame × twist in the yarn ÷ twist wanted = twist gear needed.*

Example. A frame is putting in 32 turns of twist with a 40 tooth twist gear on, what size gear will be needed to reduce the twist to 24 turns? $32 \times 40 \div 24 = 53$ tooth gear needed.

By using the square root of the yarn, the proper twist gear can be determined, without knowing the amounts of twist, by the following rule:

*$\sqrt{}$Counts on frame × gear on frame ÷ $\sqrt{}$counts wanted = twist gear needed.*

Example. A frame is running 28s warp with a 40 tooth twist gear on, what size gear will be needed to run 32s warp? $\sqrt{28} = 5.29$ $\sqrt{32} = 5.66$. Then $5.29 \times 40 \div 5.66 = 37.3$ or 37 tooth gear.

Although the universal custom is to consider the speed of the spindle as the basis for determining the amount of twist put in the yarn, the statement that every revolution of the spindle puts in one turn of twist is not correct and the ratio between the spindle speed and the front roll delivery is not the exact twist. The amount of twist actually put into the yarn depends upon the speed of the traveller, as the revolving of the traveller around the ring produces the turning or twisting of the yarn on its own axis. The traveller speed depends upon the spindle speed, the size of of the bobbin and the front roll delivery, being greatest when the bobbin is full. In other words, the traveller lags behind the spindle enough revolutions to cause the bobbin to wind up the yarn delivered by the front roll. Suppose the front roll to make 120 R. P. M., the spindle speed to be 9500 R. P. M., and the diameter of the bobbin to be ⅞ inch. Now, while the bobbin and spindle go at the same speed, the traveller lags behind. The front roll delivers, $120 \times 3.1416 = 376.99$ inches of yarn per minute. Allowing for the 3 per cent contraction in twisting, then the length of yarn actually wound on the bobbin is, $376.99 \times .97 = 365.68$ inches.

The bobbin is ⅞ inch in diameter or 2.75 inches in circumference, then, for every revolution that the traveller lags behind, the bobbin will wind on 2.75 inch of yarn and to wind on the total delivery of the front roll, the traveller will have to lag behind, $365.68 \div 2.75 = 133$ R. P. M.

Then $9500 - 133 = 9367$ R. P. M., as the speed of the traveller. Divide the traveller speed by the front roll delivery and we get the actual amount of twist put in the

yarn, as follows: $9367 \div 365.68 = 25.61$ turns per inch. Taking the spindle speed as the basis for the twist in the yarn, we get. $9500 \div 365.68 = 25.97$ turns per inch.

This shows very little variation from the correct conditions and is of not enough importance to be considered. Ordinarily the twist calculation is based on the front roll surface speed and the spindle speed, no allowances for yarn contraction or the lag of the traveller being taken into consideration and the result is accurate enough for every purpose. In the above case, the spindle speed divided by the surface speed or delivery of the front roll, will give 25.19 turns of twist per inch, not enough variation to be noticed.

Although, on most frames, there is a traverse gear, which regulates the speed of the ring rail and is changed when making wide variations in the size of the yarn, there is no calculation necessary to determine its size, it being simply a matter of judgment based upon the way the yarn lays on the empty bobbin.

### PRODUCTION.

As on the fly frame, the production of a spinning frame can be figured from the spindle or front roll speed. Either will give good results.

Example. What is the production of a frame of 256 spindles, on 28s yarn, warp twist, if the spindle speed is 9500 R. P. M., allowing a loss of time of 10 per cent: $\sqrt{28} \times 4.75 = 25.13$ turns of twist.

$9500 \times 600 \times .90 \times 256 \div 25.13 \times 36 \times 28 \times 840 =$ 61.72 lbs. per day.

The finer the yarn run, the fewer times the frame is doffed and the less the loss of time. The above allowance of 10 per cent on that size yarn, is more than enough to cover all stoppages of any nature.

The production is usually based on one spindle and this is multiplied by the total number of spindles run to give the total production.

A production constant can be worked out, from the data given in the above example, based on one spindle and no allowance for loss of time, as follows:

$9500 \times 600 \div 36 \times 840 = 188.5$ production constant.

This constant is based on full time and a spindle speed of 9500 R. P. M., and is applicable under no other conditions. However one can be worked out for any spindle speed. Rule for using the constant: *Constant ÷ twist per inch × counts of yarn = lbs. per spindle.*

*(To be Continued.)*

## CORRECTION.

The last two lines of the third paragraph in the article of "Cotton Carding" by W. S. Dean, overseer carding, Locke Mill, Concord, N. C., which appeared on page 378 of the July issue of COTTON and which reads "The difficulty of spinning it may be overcome with the same amount of twist," should read "You must overcome the difficulty of spinning it with the same amount of twist or else this property is destroyed."

In a letter to the editor Mr. Dean explains further that there is a great deal of diffuculty in opening mixed staple cotton. In many cases more twist is added. When this is done it produces a hard finish on the cloth, and this hard finish conteracts or destroys the soft finish desired. What he intended to bring out in his paper was that this mixed cotton must be spun regardless of difficulty with the same amount of twist or the proper effect is conteracted or destroyed. He also wishes to rectify the statement in regard to the diameter of rolls on the drawing frame as in that case there are four rolls 1¼-inch, 1⅛-inch, 1⅛-inch, and 1-⅛-inch in diameter.—Editor.

# KNITTING.

## REVOLVING CYLINDER HOSIERY MACHINES.

*(Contributed Exclusively to* COTTON*).*

BY H. K.

Automatic hosiery machines of this type are of more recent date than the stationary cylinder machine. Hosiery machinists are recognizing the mechanical advantages to be obtained in using the revolving cylinder, with the result that this type of machine has become very popular. Rapid strides have been made in the improvement and construction of these machines and it may be said that they have reached a high state of perfection. A few of the claims made for a revolving cylinder machine are, high speed, smooth running, less needle breakage and the requiring of less power to drive them owing to the perfect balance of the cylinder.

In discussing one machine of this type, I have in mind the knitter who runs the machines. With the demand for a maximum production from each machine, the knitter may not have the time to examine the machine for himself in order that he might make a study of the machine and become familiar with its working. By drawing attention to some of the more important mechanisms of the machine I hope to give the readers a clearer insight into these than might possibly be obtained by operating the machine.

In the knitting of any stocking, we have a number of features which are common to all, no matter on what type of machine. In the making of a half-hose, we have the transferring operation, the gradual tightening of the stitch in the leg and ankle, recipocation of the cylinder to form the heel and toe, reduced speed for heel and toe, re-enforcing of heel and toe and circular motion at high speed in the foot. These may be considered the main operations. Additional mechanisms may be provided for special purposes such as, high spliced heel and double sole, split foot, plated work, etc. In order that we can best understand the machine we will consider each operation under separate heads.

Fig. 1 shows an end elevation of the stitch regulating mechanism. This disk or cam wheel is at the end of the pattern shaft on the outside of the frame of the machine. The cam market A controls the stitch in the leg. When marks on A and E come together the surface of A forms a true circle. To loosen the stitch in the upper part of leg, lower the front end of A through eccentric E. Cam B. is for the ankle stitch. Spaces H and T are used for the heel and toe stitch. F. gives the tight stitch in the foot. L. is used for the loopers course at end of toe. D which is slightly

below the level of H and T is for the slack course to guide the looper in looping the toe. X is a space which allows the cams to be brought to their lowest position and leave the needles ready for transferring. For ladies hose this space is filled with a cam in order that continuous string work may be made. In Fig. 2 is shown two plungers L and H which are raised and lowered by coming in contact with the cams shown in Fig. I. S and S1 are set screws which are used in timing the stitch. S for the leg stitch and S1 for the heel and toe stitch. The machanism shown in Fig. 2 is fastened to an upright bar, the upper end of which supports the stitch cams, carried on the stitch cam block. Any movement given to L or H gives a similar

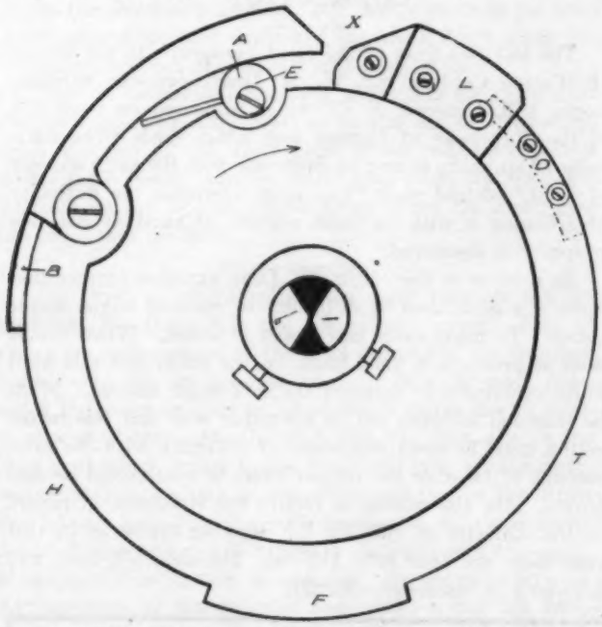



Fig. 1. End View of Stitch Regulating Mechanism.

movement to the cam plate. When the cam block is raised a tighter stitch will result, to loosen the stitch we lower the cam block through the adjusting screws S and S1.

This machine is provided with three yarn guides, thus giving the knitter an opportunity of making different kinds of work on the same machne. Plated work, high spliced heel and double sole, black leg and white foot and ordinary plain work can be made on the same machine. The plan drawing in Fig. 3 shows the lay out of the cams for the different kinds of work. Each row of cams A B C operate yarn guides A B C. The row of cams marked D are used in controlling sinkers when making ladie's hose, but taken off when making half-hose. Fig. 4 shows the yarn guides and the method of threading when using the cam arrangement shown in 1, 2, 3 and 4 in Fig. 3.

Yarn guides in No. 1 go with cam arrangement No. 1.

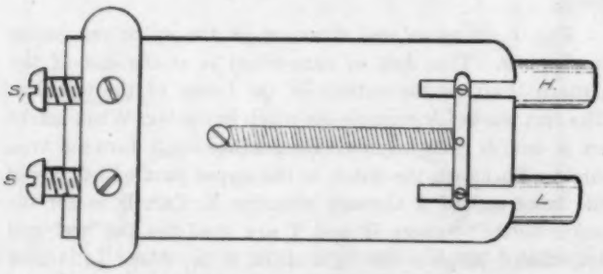



Fig. 2. Mechanism for Timing the Stitch.

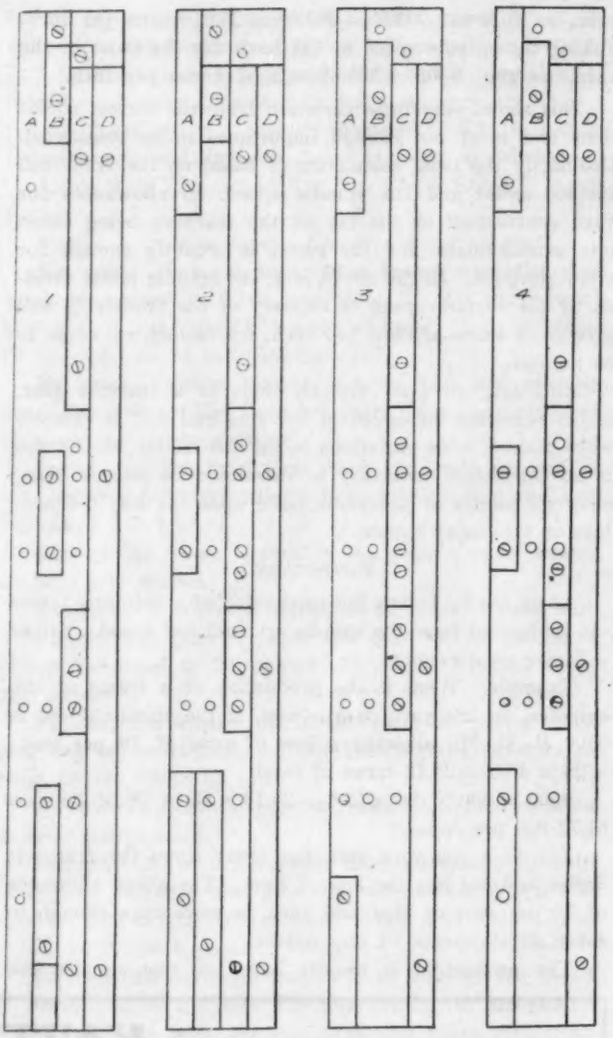



Fig. 3. The Layout of the Cans for Different Kinds of Work.

This method is used in making plated work. Yarn guide A is not in use. Yarn guide B is used to carry the heel and toe yarn, this yarn only being thrown into operation during the heel and toe. Cams on B hold out of action the heel and toe yarn. Cams on row C hold out the face and backing yarns. These yarns are out of action when the heel and toe are formed. The face and backing yarns it may be noted are fed to the same yarn guide. This yarn guide is made with three eyelet holes so that the two yarns can be fed to the needles separately and at different angles. Tension should be greatest on the face yarn so that it will show always on the face of the fabric. This machine is specially adapted for making good plated work. The arrangement of cams in No. 2 and guides threaded as in No. 2 are used for hosiery with black leg and white foot. With cams on the pattern drum the yarn guides are out of action.

The arrangement of cams and guides in No. 3 are used for the spliced heel and double sole. The yarn guide A receives its motion from a cam carried on the main shaft. This cam allows the high splicing thread to be thrown in and out of action at each revolution of the needle cylinder. Cams on the 3rd row operate a binder on the high splicing and double sole.

The cam arrangement shown in No. 4 is used for plain

work. Yarn guides are threaded as in No. 3. These cams are interchangeable and with the aid of a screw driver, the knitter can change from one kind of work to another in a very few minutes.

The transferring operation on this machine varies from the usual custom employed in stationary cylinder machines. There is no raising and lowering of the needle cylinder. When the machine presses off the stocking after completion the yarn guides are raised to a non-knitting position and the cam block lowered. The lowering of the cam block lowers the needles almost to the level of the crowns of the sinkers. The few remaining needles in the high position are pressed down by land and the cam block is drawn back

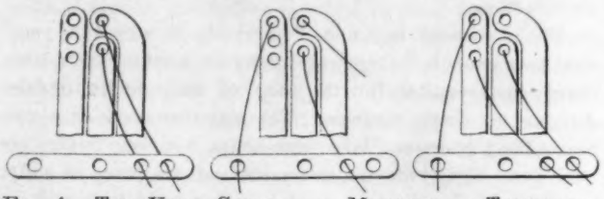


FIG. 4. THE YARN GUIDES AND METHODS OF THREADING.

from the needles. The transfer quill with the rib top attached is inserted into the cylinder the points of the quill fitting in behind the needles. With the quill in position the operator turns the machine one revolution by hand and the cam block automatically rises and the needles rising take the loops from the points of the quill. The quill is now taken off at the same time holding on to the rib top in order that the loops will not be drawn off the needles. The latch ring carrying the yarn guides is lowered and the machine is ready to start. By raising the clutch the belt is moved from the loose pulley to the fast pulley and the machine will complete the stocking without any further attention of the operator.

The machine is provided with three driving pulleys, P and P1, giving slow speed and high speed, P2 being the loose pulley. P1 is fastened to a sleeve and driving through a train of gearing gives the higher speed necessary for the leg and foot. P is the slow speed pulley and is loose on the sleeve. The reciprocation motion is given to the

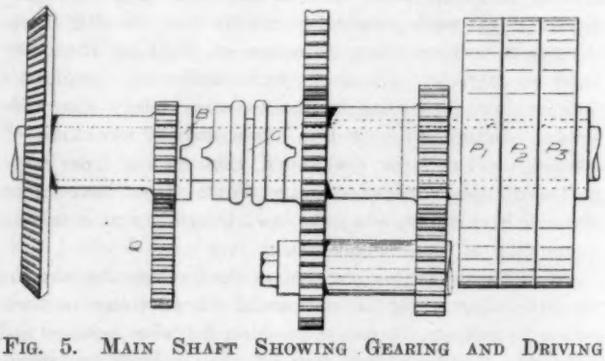



FIG. 5. MAIN SHAFT SHOWING GEARING AND DRIVING PULLEYS.

cylinder by the clutch C being moved over into mesh with pinton B. and the cylinder is now driven through the quadrant. The timing of these operations is obtained from the pattern chain on the pattern shaft. Rising links on the chain racking the drum around the desired amount.

The raising of the instep needles and the narrowing operations are common to all machines. The pickers are four in number, two droppers and two lifters. The droppers working diametrically opposite to the cam plate. The lifting pickers are situated on each side of the cam plate. Care should be taken in order that the dropper pickers are working properly, should they fail to act, a smash will result when the machine goes out of the heel or toe. The adjustment of the droppers is so fine that a knock or carelessness in operating the machine would knock them out of adjustment. The sinker ring should not be allowed to become clogged with lint, otherwise trouble will be experienced in the forming of the heel. Broken parts of needles should always be carefully removed.

A speed of 325 revolutions per minute has been obtained on this machine, but a speed of 300 R. P. M. is recommended with 185 R. P. M. in the heel and toe. Special attachments are applied to these machines in order that various kinds of work, may be made. Split foot stockings requiring a special machine. The latest improvement is that of a tuck stitch running along the sole part of the stocking where the re-enforcing thread is run in. This gives the stocking a good looking appearance and makes it resemble the finish given to some of the full fashioned makes.

Running three machines on a medium gauge say 190 needles, one girl will produce 15 dozen per day including her own transferring. On ladies hosiery, one knitter may look after 12 to 14 machines obtaining a production of 50 to 60 dozen per day. The quality of the yarn affecting the production to a great extent, as seconds are not counted into the production. The greatest trouble experienced in knitting is that of knots and slubs. A slub if allowed to run into the machine will damage a number of needles. Slubs may also cause the machine to get out of adjustment. Lint should be cleared off the machines and not blown off, if blown off it is liable to get into the yarn and later on clog the yarn guide eyes. The yarn guides should always be kept free from lint. Machines should be oiled two or three times per day.

## WHY A FIXED PRICE?

*(Contributed Exclusively to COTTON)*

BY T. H. S. CONE.

Some time ago I was caught in the rain while away from home and had occasion to buy an umbrella. As I have an unfortunate habit of losing umbrellas when not actually in use, I make it a practice to buy what is known as "dollar" umbrellas. I happened to be in the vicinity of a store on Broadway where their prices can be taken as a fair average and their merchandise is generally of good quality.

I asked for a dollar umbrella and was shown several varieties. In making a selection I noticed the tag was marked $1.10. On making enquiry of the salesman as to why the price should be 10 cents above the former figure, he entered into a lengthy explanation about increased cost, etc., and added that some establishments sold the same grade at $1.15. I then asked him if he knew what his firm paid for the umbrellas, and if the extra 10 cents went to the manufacturer. His answer was that the manufacturer put the price up only $1.00 per dozen; so it appears that the dealer was able to secure 20 cents a dozen for himself to make the price even.

As I was about starting on a business trip where I would be called upon to make prices on yarns to cotton goods manufacturers I was thinking over the arguments

that generally have to be made and this incident of the umbrella impressed itself to such an extent that I think it is worth the consideration of thinking people in our line.

In talking to knit goods manufacturers particularly, they are constantly telling us that their goods have to be made to sell at fixed prices notwithstanding all component materials, have advanced in cost.

This subject is a very familiar one, but I use two specific instances to illustrate.

A manufacturer of stockings consuming about 10,000 pounds of yarn weekly came to this market expecting to close a contract. He had some sales in view and had determined to raise his price 2½ cents per dozen. After spending some time in the market going about with his representative he came to me quite discouraged and said he would not be able to place his contract as he could not close his sales except at previous prices; in fact he said his customers wanted to buy lower so his proposed advance of 2½ cents per dozen was scorned as impractical and out of the question. I explained the yarn situation from the spinner's stand point, which he was of course familiar with anyway. He said he would have to meet the market on his stockings or lose his sales. His customers declared they could buy qualities, while perhaps not exactly as good, but which would take the place of his goods and thus meet the common market. The result was, he decided if he could buy his yarn 1 cent lower than my price he would take the hosiery orders offered and sacrifice his price accordingly. After about a week's effort shopping around, he succeeded in placing his contract with two concerns, one a commission house, the other a spinner direct. His average was ¾ cents lower than my price which had been calculated at the lowest possible level on raw material and cost of spinning, without any profit to anybody.

The second incident was similar. An underwear manufacturer came to the market showing very nice samples to his trade having figured that he could take certain orders if he could get 12 cents per dozen advance or one cent per garment. This was a 25 cent ladies vest. In this case also he failed to maintain his advance for the reasons outlined in the foregoing. His agent told him he could take it out of the goods if necessary, but could not get a fraction more in price.

Certain manufacturers having some advantages for good reasons may consider that these are extreme cases, but I think on the whole they are fair illustrations of the evils of the so-called fixed price and the majority of manufacturers have to meet it.

I have talked to some of the large distributors of merchandise about this feature and maintained that proper salesmanship would overcome the difficulty and that the merchandise put up to the buyer will sell readily at a slight advance if properly presented. The answer I got was that such a course would require a lot of argument and explanation all down the line which their salesmen did not have time nor ability to accomplish and while they were straining a point to force a sale at an advance, their competitors would go in the market at the old prices and capture all the business.

Unfortunately this is true, but it is no proof that the condition cannot be radically changed for the better. There is not one consumer out of a hundred who would hesitate to pay 11 cents or 12 cents for a 10 cent stocking or 26 or 27 cents for 25 cents underwear, if the higher price was placed on superior goods and the difference shown.

I am aware that the argument can be put forth that standard goods are most always to be had at "old prices" coming from various sources and no individual manufacturer can possibly hope to get advances of the kind mentioned, yet we are losing sight of salesmanship and common sense in putting merchandise on the market; the work of the modern salesman being merely to see his trade in large markets or travel to their head quarters with samples of well known specifications to come within that fixed price; and in finish and appearance equal to requirements without regard to the gradual increased cost of raw material and manufacturing.

The statement is made, "others do it why not you." And true enough "others" are going on wasting their time, energy and capital for the sake of maintaining a false standard of doing business. The manufacturers as a rule blame the jobbers and large merchants, but their buyers are held down rigidly by the managers and are made to suffer penalties if they make a mistake; that is if they make a purchase at an advance and later on are able to get standard goods at the old basis.

Experience has also shown that an active market which sustains an advance of raw material, gives such a glorious opportunity to the gambling element that they go after profits so greedily, never satisfied until over-indulgence brings about a radical decline, so that merchants who have believed the story and purchased for future delivery at advanced prices, find themselves compelled to revise their figures, cancel their orders, if they can on any pretext or take a substantial loss on the goods contracted for.

With a practical degree of resignation the manufacturer seems to continue his brave endeavors to conduct his business under the limitation of the fixed price contending as the case may be, with violent fluctuations in raw material, the handiwork of cotton gamblers living by their wits at the expense of those legitimately engaged in the great industry; and if demand for merchandise becomes sufficiently strong to command his production at prices carrying a small range of profit, he is at once confronted with demands of his work people for reduction of working hours without a corresponding reduction of pay; on the other hand an increase. He must work under an employers liability law that compels him to carry heavy insurance against contingencies, and in these days a new kind of competition has to be confronted, that coming from large well equipped manufacturing plants that have gone through bankruptcy and have been bought up at a trifling proportion of the original cost.

A large proportion engaged in the business deplore the conditions governing it and would do anything in their power to regulate the cotton gambler, the labor agitator and political experimenters; but in the violent movements which conditions may bring about toward a curtailment or enlargement, it seems necessary for everyone to do the best they can with what they have, carrying their financial and physical energies to the extreme test, hoping for better things; yet firmly convinced that at present about all that can be expected is the survival of the strongest if not the fittest.

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Let it be understood first of all, and distinctly that a cotton exchange does not fix the price of cotton.

# DYEING, BLEACHING AND FINISHING.

## A METHOD FOR DETERMINING THE VALUE OF COMMERCIAL STARCHES FOR USE IN COTTON MILLS.*

BY G. M. MACNIDER.

In the manufacture of all grades of cotton cloth the yarn is prepared for the loom by a process known as sizing, in which it is treated with a solution of starch to give it certain properties essential to good weaving. With many grades of cloth, the cloth goes through a process known as finishing, where it is again treated with starch to produce a "finish" before it is put on the market. It is thus seen that the cotton mills use annually large quantities of starch and the purchase of the best starch for the purpose in hand becomes a very important matter.

The value of starch for cotton mill purposes depends on its property of swelling and forming a viscous solution when treated with hot water. It is the purpose of this paper to give a method for determining the viscosity of starch solutions which will show the comparative value of the different starches for use in cotton mills. The sizing and finishing of cotton goods are very technical operations and will not be taken up in detail. Sufficient reference will be made to them to show the function of the starch solution.

The object of sizing is to make the yarn stiffer increase the strength and put it into proper condition for weaving. To accomplish this, the size must penetrate the yarn to some extent and also form a coating on the surface of the thread, which prevents wear of the thread in the loom. The size is prepared by boiling the starch (and other ingredients) with water and is applied to the yarn while hot. The machinery is so constructed that the threads are dried immediately after passing through the size.

The object of finishing is to give a stiffness to the cloth and produce a certain finish and "feel" which are very important factors in marketing cotton goods. As in sizing, the cloth is passed through a hot solution of the finish and then dried and rolled with hot rollers to bring out the finish. The use of the starch solution alone in these operations would make the goods too stiff and produce a harshness which is not desirable. To modify this, various softening agents are used, viz: tallow, various oils, soaps, magnesium chloride, magnesium sulfate, glycerine, etc., and in many mills various sizing and finishing preparations.

The principal starches used by the cotton mills are corn, potato, cassava, and to a small extent wheat, sago and rice. In England, wheat flour and rice flour are used to a considerable extent, but in America they are used very little. As will be seen later, each one of these starches has a different viscosity and therefore must be used in a different manner. Some authors attribute the differences in the characteristics of the starch solutions to the size and shape of the starch grains. There is no definite relation existing to prove this.

A number of methods have been proposed for determining the viscosity of starch pastes, but in none of them has an attempt been made to determine the viscosity of the starch under conditions similar to those under which it is used in the cotton mills; consequently they do not show the value of the starches for these purposes. Following is a brief description of the methods which have been proposed:

Whowell[2] uses a method for determining the viscosity of starch pastes which depends upon measuring the ability of thick pastes, made of definite amounts of starch, to support a known weight for a definite length of time. This method is a measure of the strength of the film formed on the surface of the paste and is not a measure of the viscosity; it frequently gives results which are the reverse of actual viscosity measurements.

Saare[3] and Martens propose a method, the essentials of which are making in a beaker a paste of definite weight and immersing in it a brass disc attached to a wire; the disc is supported at a definite point in the paste and the whole allowed to stand for 20 hours at 17.5 degrees C.; by means of a balance attached to the disc, the weight required to draw the first weight out of the paste is then measured and the last weight is taken as an indication of the viscosity of the starch.

Benz[4] and Marx propose a method for determining the stiffness of starch paste which is very similar to the one given by Saare and Martens.

Coppenberg[5] describes a viscosimeter for starch pastes in which a spherical weight is drawn upwards through a column of the paste of fixed height and temperature. The time in seconds occupied in doing this, under the pull of a known load in grams, constitutes an observation. The apparatus is adaptable only to thick liquids.

Ermen[6] proposes a method for determining the viscosity of starch in which the starch paste is made by treating the starch with a solution of sodium hydroxide. The paste is allowed to stand for a certain length of time and the viscosity determined in a Redwood viscosimeter.

The use of alkali in making the paste prevents this method from being a measure of the viscosity of the starch, as the paste formed by treatment with alkali has entirely different properties from the straight starch paste.

Beam[7] gives the following method for testing the consistency of wheat flour and starches. The samples are placed in beakers with the proper amount of water; the beakers are immersed in boiling water, allowed to remain 15 minutes, removed and allowed to cool for 12 hours. A sample of the standard starch or flour to be used for comparison is treated in the same manner. "Any variation in the consistency may be judged by pressing the fingers into each sample."

In both sizing and finishing the starch is boiled with water for a certain length of time and the solution applied to the yarn or cloth at a temperature a few degrees below boiling. The temperature is not allowed to fall below 70 degrees C. and is usually maintained at about 90 degrees C.

*Reprinted from the Journal of Industrial and Engineering Chemistry, Vol. 4, No. 6, June, 1912.

[2]Chem. News, 39, 97.
[3]Zeits. Spiritusind., 26, 1903; Abs. in J. Soc. Chem. Ind., 22, 1903.
[4]Chem. Ind., 32, 1909; Abs. in J. Soc. Chem. Ind., 28, 1909.
[5]Chem. Zeit., 34, 1910; Abs. in J. Soc. Chem. Ind., 29, 1910.
[6]J. Soc. Chem. Ind., 26, 1907.
[7]"The Chemistry and Practice of Sizing."

These methods do not test the viscosity under conditions similar to those under which the starch is used in the mills, and consequently no deductions can be made from the results as to the value of the starches for mill purposes.

In the following method the starch solution is prepared by boiling the starch with water for a definite length of time and the viscosity of the hot solution is measured by means of a Scott viscosimeter. In this way the viscosity of the starch solution is obtained under conditions practically identical with those under which it is used in the mill.

Before starting the determination, the viscosimeter bath should be filled with water which is kept boiling throughout the operation. The method is as follows:

Twelve grams of the starch are weighed into a 600 cc. beaker, 300 cc. distilled water added (thus making a 4 per cent. solution) and heated over a Bunsen burner with constant stirring to the boiling point and boiled for ten minutes; 200 cc. of this solution are then poured into a viscosimeter cup, the temperature allowed to become constant, and 50 cc. run out into a graduate, the time being accurately measured with a stop watch. The number of seconds required to deliver 50 cc. of the solution divided by the number of seconds required to deliver 50 cc. of boiling water gives the viscosity.

Before the starch is weighed out it should be thoroughly pulverized to remove the lumps. During the heating and boiling it is very necessary that the solution be constantly stirred to prevent the formation of lumps and caking on the bottom and sides of the beaker. Glass beakers break so easily in boiling the heavy solutions that aluminum beakers were substituted and used for all determinations.

A number of determinations were made at first to determine the best amount of starch to use and the necessary length of time to boil the solution. It was found that a four per cent. solution of starch was the most satisfactory strength to use. With thin boiling starches this strength solution is heavy enough to measure the viscosity satisfactorily while the starches forming thick solutions are not too heavy to interfere with the accuracy of the determination. With potato and cassava starch it would be practically impossible to obtain accurate results with a stronger solution. Ten minutes was decided upon as the best length of time for boiling, as this is long enough to develop the characteristics of the starch and at the same time the solution has not been effected by loss from evaporation. The temperature at which the determinations were made was the temperature which the boiling solutions assumed on being poured into the viscosimeter cup, the viscosimeter cup being surrounded by boiling water. With most of the starches this was 94 degrees C. With rice starch the temperature fell to 92.5 degrees C. It was found that at such high temperatures a variation of one or two degrees does not appreciably effect the viscosity, though at lower temperatures a variation of less than a degree produces a marked effect. In all determinations checks were obtained which did not show a variation greater than two-fifths of a second and most of them checked within one-fifth of a second. With the viscosimeter used, the time required to deliver 50 cc. was 9 seconds. This figure was used in calculating all determinations.

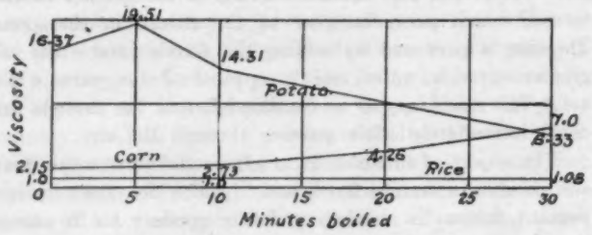
The following table shows the viscosity of the starches examined and the variation in the viscosity of different lots of the same kind of starch

VISCOSITY OF COMMERCIAL STARCHES.

12 grams starch in 300 cc. water; boiled 10 minutes.

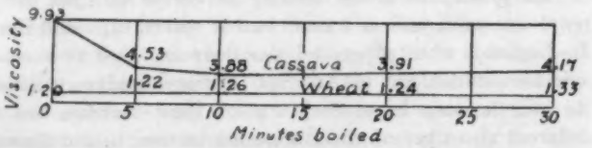
| No. | Starch. | Seconds to deliver 50 cc. | Viscosity. |
|---|---|---|---|
| 510 | Corn | 22.4 | 2.49 |
| 508 | Corn | 25.8 | 2.86 |
| 521 | Corn | 24.6 | 2.73 |
| 502 | Potato | 128.8 | 14.31 |
| 524 | Cassava | 35.0 | 3.88 |
| 526 | Cassava | 35.8 | 3.97 |
| 527 | Wheat | 11.4 | 1.26 |
| 525 | Wheat | 11.2 | 1.24 |
| 528 | Rice | 9.0 | 1.00 |

From the above tables is seen that there is a wide variation in the viscosity of the commercial starches and consequently an equally wide variation in their value for mill purposes. It will be noticed that there is a considerable variation in the viscosity of different samples of the same starch. This may be due to several factors: the maturity of the plant from which the starch is made, the method used in manufacture and the manner in which the starch is dried; the latter will effect the amount of moisture in the starch. Starches of the same kind with different moisture content will show a variation in viscosity. This variation will be small unless the variation in moisture content is very large. While no attention is paid to the viscosity at present, it would be very advantageous to the mills for each lot of starch (of the same kind) to have a uniform viscosity. This would enable them to obtain the same results in sizing and finishing without changing the formula for each lot of starch. By the above method a very small variation in the viscosity of a starch may be detected.




In practice the starch solution is boiled for a certain length of time before being used. To determine what effect this has on the viscosity of the solution, viscosity determinations were made at different periods of boiling with each starch. The results obtained are shown by the accompanying curves.

In boiling the starch solutions no attempt was made to keep the volume constant, as the addition of water to a




starch solution materially reduces the viscosity. The loss from evaporation was practically the same with all solutions, and as they were carried out under the same conditions the results are comparable. In boiling rice starch 30 minutes the loss from evaporation was greater than with the other starches, but as this starch shows no change in viscosity on continued boiling this need not be considered.

From the curves it will be seen that the viscosity of

corn starch increases uniformly with the length of time of boiling. This increase is about what would be expected with the concentration of the solution when there is no change in the starch. This is a very valuable property of corn starch as compared with other starches.

Potato starch reaches its maximum viscosity after being boiled five minutes. From this point the viscosity decreases rapidly with the increase in time of boiling, the concentration of the solution apparently having no effect on the viscosity. After boiling ten minutes, potato starch has a viscosity slightly more than five times as great as corn starch, while after thirty minutes the viscosity of potato starch is less than that of corn starch which has been boiled the same length of time. The author has found a number of references to the fact that potato starch "loses its strength" or liquefies on boiling, but has found no reference to the degree to which this takes place. The data given here show very strikingly the effect of boiling on this starch. Corn and potato starch form the two extremes in regard to this property.

Cassava starch attains its maximum viscosity at the boiling point. The solution apparently has a higher viscosity shortly after complete gelatinization takes place, but no measurements were made of this as starch is not used until it has been boiled. After reaching the boiling point the viscosity decreases uniformly with the length of time of boiling. After boiling thirty minutes there is an increase in the viscosity over that of the solution boiled twenty minutes. This increase is probably due to increased concentration. With both potato and cassava starch the solutions contain a good many air bubbles which sometimes interfere with the accuracy of the determination. As will be seen from the curve, cassava starch behaves in a manner very similar to potato starch as regards the liquefaction of the solution, but not to the same extent. Cassava starch therefore has a much broader application in sizing and finishing than potato starch.

Wheat starch has a much lower viscosity than any of the starches so far considered. It shows a gradual increase in viscosity with the time of boiling, similar to corn starch, though the total increase is small, the viscosity of the thirty-minute determination being only slightly higher than the determination made at the boiling point. Wheat starch foams more in boiling than any other starch.

Rice starch has the same viscosity as water. At the end of thirty minutes' boiling it shows only a very slight increase in viscosity.

It is a fact that starch goes into solution on continued boiling, that is, it is converted into soluble starch. The degree to which this takes place varies with the different starches. This is the only way of accounting for the marked differences in the viscosities of the various starches. Why the rate of solution should be so high in potato and so low in corn is not known. It is a remarkable fact that the starches from roots and tubers, developed under ground, potato and cassava, show a high rate of solution while the starches from the grains, developed above ground, corn, wheat and rice, show a very low rate of solution.

A number of starches are now used which are sold under a trade name, the advantages claimed for them usually being that they are "thin boiling starches." These are usually corn starch, which has been treated in some way to reduce the viscosity. The viscosities of six such starches are shown in the following table:

VISCOSITY OF SPECIAL OR TREATED STARCHES.

12 grams starch in 300 cc. water; boiled 10 minutes; temperature 94°C.

| No. | Starch. | Seconds to deliver 50 cc. | Viscosity. |
|---|---|---|---|
| 506 | Eagle finishing ..... | 10.4 | 1.15 |
| 519 | N starch, alkaline..... | 19.2 | 2.13 |
| 511 | Blue River, Pearl ..... | 19.2 | 2.13 |
| 529 | Famous N ..... | 10.6 | 1.17 |
| 530 | Thin boiling Crystal .... | 11.2 | 1.24 |
| 531 | Thin boiling Pearl ..... | 11.0 | 1.22 |

The Eagle finishing starch is corn starch treated with borax. The viscosity is less than half as great as that of straight corn starch. It will be seen from data given later that this starch has been treated in some manner other than the addition of a small amount of borax.

The N starch is corn starch made slightly alkaline. The alkalinity of this starch is equivalent to 0.001 gram of sodium hydroxide to each gram of starch. The viscosity of this starch is a few points lower than corn starch.

The other samples are treated corn starch, which are neutral and do not show any evidence of the way in which they have been treated.

Some determinations were made to ascertain the effect of several reagents known to be used in treating starches, on the viscosity of corn starch.

The effect of boiling corn starch with borax is shown in the following table:

EFFECT OF BORAX ON VISCOSITY OF STARCH.

12 grams starch in 300 cc. water; boiled 10 minutes; temperature 94°C.

| No. | Starch | Borax added Gram. | Seconds to deliver 50 cc. | Viscosity. |
|---|---|---|---|---|
| 510 | Corn ..... | | 22.4 | 2.49 |
| 510 | Corn ..... | 0.077[8] | 19.0 | 2.11 |
| 521 | Corn ..... | | 24.6 | 2.73 |
| 521 | Corn ..... | 1.0 | 26.0 | 2.86 |

From the data given, it is seen that a small amount of borax reduces the viscosity, but a slightly larger amount increases the viscosity. Bean[9] found that borax added to a thick starch paste while hot causes the sticky paste to lose its power of adhering to other substances and develop strong cohesive powers. The paste thus formed has the appearance of a jelly and may be rolled in the hands without any of it adhering to the hands. The properties of the starch are completely changed. The author has found a finishing preparation which is composed of starch treated with borax in this manner. Boric acid does not produce this effect.

The effect of boiling corn starch with alkali is shown in the following table:

EFFECT OF ALKALI ON VISCOSITY OF STARCH.

12 grams starch in 300 cc. water; boiled 10 minutes; temperature 94°C.

| No. | Starch | NaOH added. Gram | Seconds to deliver 50 cc. | Viscosity. |
|---|---|---|---|---|
| 521 | Corn ..... .... | | 24.6 | 2.73 |
| 521 | Corn ..... | 0.06 | 20.8 | 2.31 |

The amount of sodium hydroxide used was calculated from the alkalinity of the sample of N starch. From this it is seen that a very small amount of alkali produces a

[8] Amount of borax calculated from ash determination of No. 506.

[9] "The Chemistry and Practice of Sizing."

decided decrease in the viscosity. Some determinations were made using one-half of one per cent of sodium hydroxide, but as soon as gelatinization took place the solution foamed so much that it was not possible to boil it. This excessive foaming would prevent the use of any considerable amount of alkali in sizing. The data obtained shows that a very small amount of alkali reduces the viscosity of starch, but a larger amount increases the viscosity.

In analyzing some sizing preparations it was found that boric acid was frequently used in them. Some determinations were made to determine the effect of boric acid on the viscosity of starch. The results are given in the following table:

EFFECT OF BORIC ACID ON VISCOSITY OF STARCH.

12 grams starch in 300 cc. water; boiled 10 minutes; temperature 94°C.

| No. | Starch. | Boric acid added. Grams. | Seconds to deliver 50 cc. | Viscosity |
|---|---|---|---|---|
| 508 | Corn ..... | .. | 25.8 | 2.86 |
| 508 | Corn ..... | 1 | 23.2 | 2.57 |
| 508 | Corn ..... | 3 | 21.8 | 2.42 |
| 508 | Corn ..... | 6 | 23.0 | 2.55 |

From this it is seen that a very small amount of boric acid reduces the viscosity, but when the amount is increased to as much as one gram of boric acid to two grams of starch the reduction in viscosity is not as great as when a smaller amount is used. If boric acid is used in sizing it should be used only in small amount.

It is often stated that some starches give a smooth finish to goods while others give a harsh finish. This property adapts the starches which produce a smooth finish for use on the finer grades of cloth which must have a smooth, soft finish, while the starches which do not produce such a finish are better adapted to the heavier grades of cloth. With most grades of cloth, no matter which one of the starches is used, some softening ingredient must be used with the starch to produce the desired result, and it is therefore more economical, in the majority of cases, to use a cheap starch and control the finish by use of softeners than to control the finish by varying the kind of starch used.

From the data which has been presented it is seen that the viscosity of the starch solution is the most important point to be considered in sizing and finishing cotton goods. As has been previously stated, to give satisfactory results the solution must penetrate the yarn or cloth and also form a coating on the outside. The viscosity does not show the stiffness which will be given to yarn or cloth. This would be very difficult to determine, but it shows the comparative penetrating ability and the effect of boiling on the starches, and from this can be judged the effect which any given starch will produce on yarn or cloth. As there is so much difference in the viscosities of the several commercial starches it is very important for the manufacturer to use the starch which will give the most satisfactory results. When the costs of the different starches are considered this becomes a still more important matter. If, in sizing and finishing, the manufacturers will use only the kind of starch and softeners which are actually necessary to produce most economically the desired results, it will result in a great saving to all the mills engaged in this class of work.

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Manchester cotton yarn was shipped to the United States during the first four months of this year to the extent of 1,943,800 pounds.

## NOTES ON DYEING, BLEACHING AND FINISHING.

### The Newest and Latest Chemical Facts From the Laboratories of the World. Prepared for and Contributed Exclusively to "Cotton."

BY J. MERRITT MATTHEWS, PH. D.

### Analysis of Finishing Materials.

The analysis of finishing materials includes the study of the reactions of such bodies as various kinds of starches, dextrin, glucose, vegetable gums, gelatin, Irish moss, albumen, etc. Owing to the complex nature of the bodies, it is rather difficult to obtain very definite reactions of a chemical nature to sharply distinguish them one from another. By the following scheme of analytical reactions, however, the various substances under consideration may be generally identified.

*A. General Reactions, using aqueous solutions of the sample.*

1. The addition of alcohol causes the precipitation of dextrin, starch, gum arabic, vegetable gums and mucilaginous substances, glues, albumen, glucose (in concentrated solution only.)

2. The addition of Fehling's solution causes the precipitation of red copper oxide in the presence of glucose, dextrine (in concentrated solution), vegetable gums (on prolonged boiling), gum tragacanth (after long heating.)

3. The addition of tannin solution causes the precipitation of glues, albumen, dextrin (in concentrated solution), Iceland moss, and linseed mucilage.

4. The addition of a solution of basic lead acetate causes the precipitation of vegetable gums, starch (in concentrated solution), glue (in concentrated solution), and albumen.

5. The addition of a 5 per cent. copper sulphate solution and caustic soda gives a precipitate of red copper oxide on boiling with glucose, dextrin (in concentrated solution), vegetable gums, and gum tragacanth.

6. The addition of a solution of barium hydrate gives a precipitate with gum traganth, carragheen moss, Norgine, starch, glues, and albumens.

7. The addition of dilute sulphuric acid and boiling gives glucose or other sugars capable of reducing Fehling's solution with starch, dextrin, and vegetable gums.

*B. Characteristic reactions.*

1. The addition of iodine solutions gives a blue color with starch and a red or brownish-red color with dextrin.

2. Dilute acid yields precipitates with Norgine preparations and albuminous substances.

3. With copper sulphate or cobalt nitrate Norgine preparations alone are precipitated, yielding gelatinous precipitates.

4. The addition of a barium hydroxide solution gives a yellow color on boiling with tragacanth preparations.

*C. Reactions with Nessler's reagent.*

With gum arabic, cold, a pale yellow precipitate is formed turning to a dirty orange color on heating, with the formation of a fine black precipitate. The latter is insoluble in sulphuric or acetic acid but is soluble in nitric acid on prolonged boiling. If sulphuric or tartaric acid is added to the solution before warming, only a trace of black precipitate is then produced.

Norgine, cold. An intense yellowish red coloration is formed which is darkened slightly on boiling.

Tragacanth, cold. A pale yellow coloration is produced. When heated a slight flocculent precipitate results.

Glue, cold. No change is produced. Warm, a black precipitate is formed. This is mostly soluble in sulphuric or acetic acid and tartaric acid. If sulphuric acid be added before warming a white milky turbidity is produced and no black precipitate is formed.

Carragheen Moss, cold. A flocculent precipitate which is soluble in sulphuric and tartaric acid is produced. On heating the liquid becomes yellow and opalescent. Sulphuric acid or large quantities of tartaric acid prevent this reaction from taking place.

Linseed, cold. A pale yellow coloration is formed. Warm, a slight, flesh-colored precipitate is produced which quickly dissolves again. The liquid, however, remains turbid and a yellowish brown color is formed.

Glucose, cold. No reaction is produced. Warm, an orange red precipitate is formed which on further heating turns black. Acid, however, prevents this reaction from occurring.

Dextrin, cold. No reaction is formed. Warm, a red precipitate which redissolves on further heating is produced and the solution remains turbid and yellow. Its turbidity is not discharged by acid. After some time a slight black precipitate is formed. Acids, however, interfere with the reaction.

Soluable starch, cold. No reaction is formed. Warm, a turbidity is produced. On addition of tartaric acid the turbidity is partly cleared, and the liquid becomes a dirty green.

*D. Reactions with a solution of ammonium molybdate.*

Gum arabic, cold. A slight turbidity is produced becoming more intense on heating with the formation of a pale blue color. This reaction however is not produced in the presence of sulphuric or nitric acid.

Tragacanth, cold. No reaction is produced. Warm, a slight turbidity is formed which is discharged by nitric, sulphuric or acetic acid.

Glue, cold. An intense white precipitate which disappears on heating is produced. In presence of large quantities of acid this precipitate is very slight.

Carragheen Moss, dextrin and soluble starch do not react with this reagent.

Norgine. A white gelatinous precipitate is produced becoming stringy on warming. Insoluble in acid.

Linseed mucilage. A slight opalescence becoming stronger on heating and intense on addition of nitric acid. After some time a slight precipitate is formed which is insoluble in acid.

Glucose. There is no reaction in the cold. The solution turns green however on prolonged heating but without turbidity. Sulphuric acid prevents this color change from occurring.

When it is desired to test the finishing materials on a piece of cloth a sample of this cloth is boiled with water and an aqueous liquid should be employed for the test. The following order of procedure in making the analysis gives the best results:

Fat, resin and inorganic constituents are tested for separately. Starch and dextrin are then tested for by the iodine reaction and glucose by Fehling's solution. The substance, after removing fats if present, is dissolved in water and treated with a little dilute nitrate acid. If a gelatinous precipitate is formed Norgine is present. The mixture is then slightly warmed and filtered. The filtrate is cooled and treated with a neutral ammonium molybdate solution. If a flocculent white precipitate is formed, either at once or on standing, glue is present. The solution is filtered after some time and the filtrate treated with alcohol after having first been neutralized with ammonia. If the precipitate is formed it may contain starch, dextrin, gums and vegetable mucilaginous matters other than Norgine. The filtrate is tested then for glucose and glycerol, the persence or absence of starch, dextrin, and glucose having first been determined. It remains to distinguish then between vegetable mucilages and gums. This is the most difficult operation in the whole of finishing analysis. Special tests can be used for Norgine and gum arabic, and if sufficient material is available gum tragacanth may be tested for by the barium hydrate test. A lead acetate reaction is also of value in detecting other vegetable products.

## WHAT IS THE HEIGHT OF A DAM?

It is rather surprising to find that there is no rigid rule for measuring the height of a dam. Although possibly one-third of all the water power suits relate to the height of the dam or stage of water there seems to be absolutely no judical decision on the subject. A lawyer explains how a court would ignore such a question as a rule to measure the height of a dam.

In reply to a request for his opinion on this much discussed question, Chas. T. Main, engineer of Boston, who is an authority on water power developments, states that the height of a dam usually means the height from the bed of the river at its lowest point to the crest of the dam. That is the height of the physical structure. The height usually varies from the point of maximum, decreasing as it approaches the banks of the river on either side. It usually has nothing to do with the fall or the power produced, as for example, in a development in which water is carried for some distance through canals, penstocks, or flumes, the dam which diverts the water from the river at the head works into conduits may be only a few feet high, whereas, the head is the difference between the level of the water at the end of the conduit, usually in a termanal reservoir if the distance is long, and the surface of the water in the river below the station, which is in some cases as high as a thousand feet or more.

It is only in such developments as when the whole head is created by the construction of a dam that the height of the dam approximates the head producing power. In some instances it is necessary to go to a considerable distance below the bed of the stream for a foundation for a dam, but the depth of the foundation below the bed, in Mr. Main's opinion, should not be included in the height of the dam.

The height of the dam cannot be measured by the height of the water above and below the same, as this is usually a varying quantity, depending upon the amount of water which is flowing over the dam and the various conditions of the river which effect the flow.

# Practical Problems Discussed by Cotton's Readers.

We invite our readers to make use of this department for the discussion of any and all problems arising in the mill or the finishing plant. Questions, answers or letters need not conform to any particular style and will be properly edited before publishing. The editors do not hold themselves responsible for any statements of opinion or fact which may appear in this department unless so indorsed. This department is open to all.

## ANOTHER REASON WHY?

BY C. M. S.

I was much interested in the question of your correspondent entitled "Why" and also in the answer which another correspondent made to same. To be candid I hardly think the cause the gentleman stated was the trouble, would effect a frame in this way, for if the joint was loose instead of causing the ends to run slack it would, if on the front roll, tighten them up so tight that there would be a breakage of the ends at the presser on the flyer where the ends are wound on the bobbin. Then again if the roll was worn in the joint or square this trouble would only happen when the frame was started.

As for the ends running slack from this cause I believe this is a wrong assumption, as it would cause tight ends instead of slack ones. Now the rolls deliver the roving to the bobbins and are driven from the head of the frame, therefore it is plain to see that if there is a draw or holding back on one end of the roll caused by the square wearing round, the ends will run tight, as the bobbins at one end of the frame will all be winding just as fast as they are on the other. If the back roll were to break in two a few joints from the foot end of frame it might be carried along for a time by the pull on the stock from the front roll and the friction or rub of the good end of the roll, in that case the work made on that end of the frame would be light as there would be a drawing out of the work on the broken end of roll. Consequently the roving would be finer, and the bobbins would not increase in diameter as fast as the bobbins would on the good end of the frame. Consequently as the diameter of the bobbin would be less than on the other end of frame the end on this part would run slack. In this instance it would be a continuous thing, more noticeable as the frame filled up than when first doffed.

In this case the back roll would have to be either broken squarely off with a good pull from the front roll and quite a lot of rub from the good end or be worn so badly that the square would gradually slip completely round in its socket in the roll. This might have been the trouble with the gentleman asking "Why." Yet, if it should happen, which is very improbable, it would be an every doff occurrence, and the trouble would increase as the day and the end of the doff advanced instead of decreasing as the writer stated. As he was on No. 4.50 hank roving possibly he doffed the frame only about every 8 hours and then in the afternoon, and as this trouble would not be noticed so much when the frame was first started this was the reason he was led to believe that his trouble only occurred on the first doff each day and early morning. Such a condition as I have explained above is of a very rare occurrence, for should a joint be worn enough to slip the ends will generally be cut down and the trouble can be located at once.

## ANOTHER ANSWER WHY.

BY B. M. P.

In a recent issue of "COTTON" under the heading "Why," "W. B. W." presents a problem and gives his solution. I wish to quote a part of the article so that the exact connection may be seen.

"I had a speeder on 4.5 hank roving that had a bad habit of starting up slack for about a third of the way from the foot end of the frame the first thing in the morning and bothering the tender until she doffed and then it ran all right until the next morning, when it was the same thing over again.

"Finally I took the front steel roll out and found one roll, about a third of the way from the head, with the square loose and quite badly worn. I had this fixed so as to make the roll tight and have had no further trouble." "W. B. W." also mentions the fact that "the foot end of the speeder came within two feet of the window."

I am afraid that the true cause of the trouble with slack ends was not in the condition of the steel roll as "W. B. W." thinks, for if such were the case, the ends from the point where the bad joint was found to the foot end of the frame would run slack or, in other words, the ends on the lower two thirds of the frame, corresponding to the length of the roll affected by the bad joint. In the case in question only the ends at the lower one-third of the frame were affected.

Taking what "W. B. W." says as final, we have a frame that has a bad joint in the roll. This bad joint comes one third the distance from the head end of the frame. The ends on the lower one-third of the frame run slack in the morning. This condition was due to the bad joint and was remedied as soon as the joint was made tight. In other words; this bad joint, coming one-third the distance from the head end of the frame affects the tension of the ends at the lower end, causing them to run slack while the ends in the middle of the frame, running under exactly the same conditions as those at the lower end, are not affected at all, and further still, remedying the defective joint must affect the lower two thirds of the steel roll, but affects the tension of the ends at the lower end of the frame only causes them to run tight but does not affect the tension of the ends on the middle one-third of the frame.

Such a contention as the above must be abandoned regardless of how much evidence it may have in support of it. I have run frames with loose jointed rolls and managed to have no trouble with my tension except what would ordinarily occur and I have had the same trouble with all the ends on a frame, that "W. B. W." had and nothing would give relief until the cone belt was shifted slightly, increasing the tension and making a bad place on the nose of the bobbin. At the same time another frame, just starting

off would give no trouble at all. This was noticed particularly in the winter when the outside temperature was very low causing quite a change in the inside temperature of the room between day and night. In this case I attributed the trouble to the fact that the exceedingly low temperature of the room at night caused the bobbins on the frames to actually contract and become smaller hence, when starting time in the morning came, the bobbins did not have the effective diameters as the evening before and did not wind on the roving as fast, causing the ends to run slack.

This explanation may fit the case mentioned by "W. B. W." for the end of the frame nearer the center of the room gave no trouble, while the end nearest the window, where the temperature would be lowest at night, gave the most trouble because the bobbins at that end contracted and becoming smaller would not take up as fast as the remaining bobbins on the frame. It is simply out of the question to contend that the trouble was caused by the bad joint and was overcome by tightening the same. If he will look he may find the same trouble on the same or other frames next winter.

## THE DUTY OF THE MILL MANAGEMENT TO THE VILLAGE.

BY N. F. S.

In order that a mill may prosper one of the greatest essentials is for the best of feelings to exist between the mill owners and employees. No mill can enjoy success without it. Mill owners should awaken to their manifest duty and in a few years a better class of help would be the result. Show the average employee that you take an interest in his or her welfare at home and in the mill and the result will be more dividends for the stock holders.

See that the work is situated so it will be as pleasant as possible. Give all the ventilation and sanitation necessary in order that good health may prevail, for the health of a mill village is the first inquiry of a prospective hand. Above all things remember the families in their homes. Make the home and surroundings pleasant and you will have a family that will be with you for generations to come. Show yourselves willing to help them beautify their homes. Only a rose bush planted at the porch corner of a badly kept premises might awaken a pride in the family that no beauty could ever satisfy. When you find a family that is contented and so to speak "living at home," it is worth a dozen of the come easy go easy kind. A great many mills are now furnishing free flower bulbs and grass seeds to those employeers who desire them and are thereby adding dollars to their property and happiness to the employee. It is well for the proprietors to inspect the improvements made by the home keepers, and compliment the worthy ones, as this will cause some one else to make an effort, for Adam's race love praise. Be sure and keep tenement houses in good repair, have all complaints remedied at once if possible, for so many people are prone to think you forget their needs as long as they work six days in the week. You are not required to visit them in their homes, but try to personally know as many of your hands as possible, it gives you an advantage in business with them and at the same time gains their respect.

## WATCHING FOR THE LITTLE THINGS.

BY GEORGE RICE.

In a certain textile factory the goods were not selling as well as they should, due to the condition of the selvages. Now the selvage of a fabric will often sell the cloth. The border and the selvage of some of the goods on the market are made with exceptional fiber so as to give the impression of greater value in the body of the texture. In olden times, coarse and shoddy threads of all kinds were woven into the borders and selvages of the goods and nobody cared. But the commission man and the retailer of cloth demands that the bordering and the selvage of the goods be made of first class stock and well colored and designed. Hence in the case of the mill in mind, the goods were handicapped from the start due to the defective nature of the selvages.

An examination proved that the borders and the selvage threads were made of superior fiber, and that the threads were properly twisted and arranged in the heddles of the looms. But upon examining the looms, I noticed that the temples for supporting the selvages in line during the weaving were not correctly adjusted, resulting in causing a separation of the filling threads as illustrated in figure 1. The little points in the cylinder in some of the temples were bent or broken, causing the filling threads to catch on the same and lay unevenly. Some of the cylinders in the looms were clogged with waste threads and did not turn.

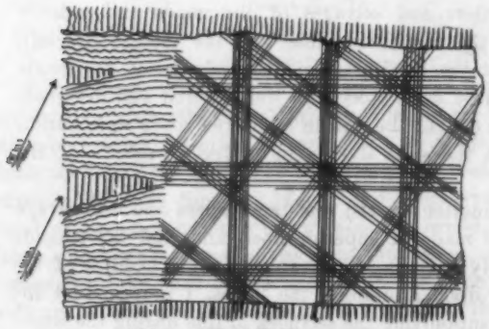
Then for lack of oil, some of the temples were out of commission. On one loom the temple shank had broken off and in its place a cord running over a pulley, supporting a weight, with a hook to fasten into the selvage was used.

Of course this hook contracted only in one place in the selvage and therefore pulled on the warp yarns and made bad openings in the texture, destroying the uniformity of the selvake. In another case there were numerous threads missing from the selvage because the weaver was not told to keep the threads up off the floor, but allowed them to run to waste. Then in another loom the selvage was minus several of the threads due to the breaking out of the heddles and the fixer on that section did not restore the heddles, so the weaver had to draw the threads in double in other heddles, thereby making double threads all the length of the selvage of the goods.

This is only one of the reasons why the goods of that mill failed to meet with the approval of the purchasers but it proved to be a serious one. In fact the mill was on the sick list. The engineering doctor was needed to reform certain departments. The weaving rooms were in need of some one of authority who could point out and remedy the many little items that were making the goods of that plant go into the market as seconds, thus causing a loss every month to the owners. The writer found that the mill company was using superior stock in its goods and that this stock was not properly treated in the various departments of manufacture.

There are other textile plants in which an inferior grade of stock is employed, and yet the output sells better because every advantage is taken to make the poorer stock produce perfect goods. For illustration, in the mill first mentioned, the writer observed a loom weaving some fine goods of expensive nature. One edge of the goods presented a chaffed appearance. This condition showed even

in the finished article. It was caused by the knicked steel points of one of the shuttles as in figure 2. The weaver was a competent person so far as running the loom was concerned. She could tie good knots and make quite perfect cloth. But when something occurred to affect a part of the cloth that did not directly concern the production of the loom, then the weaver felt that she was doing her part. Her main object was to get off the cloth at so much per yard and if the cloth would pass the inspector, then all would be well. But in this case the slaying condition of one edge of the goods, extending inward about one-half a



BAD SELVEGE.
Fig 1

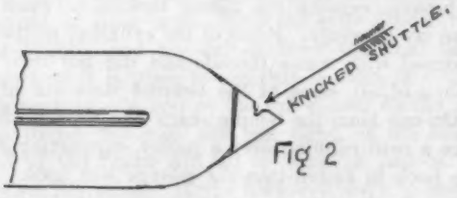



Fig 2

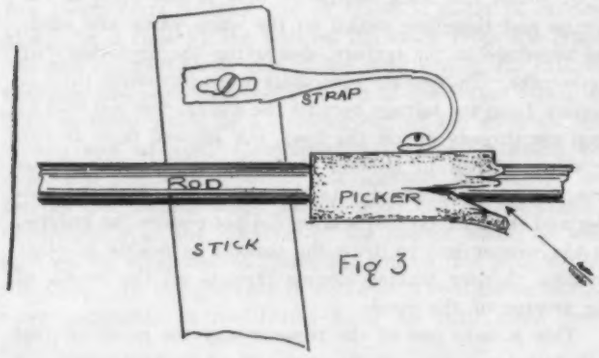



Fig 3

yard, proved to be detrimental to the sale of the bolts at first class values. Second class values had to be made because the knicked place in the steel point of the shuttle frayed and chaffed the warp threads at every trip through the shed of the loom and this frazy order of things continued to the last, making the cloth take on a scorched condition along that side. This of course cut into the profit on the goods, as the price had to be reduced and the mill company lost.

Another sick mill was cured when an overseer took hold of the weaving division and found that the fixers were running some of the rawhide pickers on the looms with the pickers in the worn and broken order shown in figure 3. This defect caused two disorders. First, a loss of time at the loom, because the broken picker often made the loom "bang" and this of course caused delay to the weaver who would have to get the shuttle from out of the shed and start the loom again.

Secondly the goods were injured because often the filling thread caught on the broken end of the rough picker and was drawn in double for a half a yard or more with the action of the shuttle. This made double filling picks at intervals and of course produced imperfections in the goods. New pickers were ordered put on by the overseer as soon as he discovered the condition of the old pickers after which the trouble ceased.

I was glad to note in the February issue of COTTON, that a "fixer" who signed himself Guy M. Vann, was taking up this subject of bad selvages and that he had invited others to write of their toubles in the mill. If the fixers would get interested and all try to secure better success by discussing their difficulties through the columns of this department, I am sure that the resulting benefits would insure an increased wage return from their various mills.

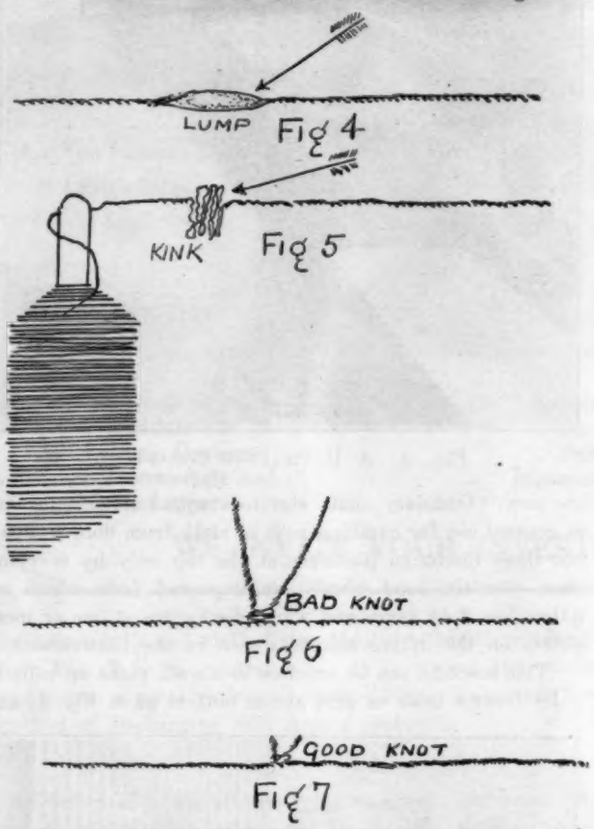
In another factory inspected there were numerous complaints about the character of the finished goods. The mill was on a line of fancy textures in which any imperfections in the opening, picking, carding or spinning would be sure to show. I found that one of the leading defects in the goods was due to the manner in which the carding was done. The roving was allowed to come off from the rings unevenly due to incorrect adjustment of the same. Consequently there were lumps in the roving that the drawing in the spinning could not take out. The draft effected while the twist is put into the strands to make the yarns is always depended upon to draw out numerous lumps. The high places are reduced and the low ones built up in the drawing out of the roving. But in this case the lumps were too prominent. In figure 4 is shown one of the lumps after the twist was put into the strand during the drawing and spinning operation. The twist has a tendency to go into the smaller diameters of all strands, thereby exposing the lump more and more. This is because the lumpy place is heavy and bulky, and is liable to be revolved around without taking any of the twist. The twist goes into the places of smaller diameter.

This lumpy condition showed all through the future operations of spooling, warping, weaving and finishing. Some of the lumps broke out in the reeds of the warping and weaving machinery, thereby causing unnecessary waste of yarn. Some of the lumps were broken out by the weavers and finishers and this made a loss of time. In the final inspection of the goods the girls at the boards pulled out what lumps they noticed and made repairs on the goods.

Because of the lumps or the imperfect places created in the finished textiles, the commission men were obliged to reduce the first price on the goods and the retailers had to mark some of the pieces and sell them as seconds. Hence the mill company lost a liberal percentage of the profits that they should have received. Upon effecting a remedy for the trouble, the standard value was obtained for the product, but this remedy was not made until some thousands of dollars were lost in finding out where the trouble lay.

In another instance of a similar nature, the mill company had a lot of goods on the sick texture list due to the defective adjusting of some of the spinning machinery in the mule room. Figure 5 illustrates what happened for several weeks during which time a lot of kinky yarn and

cloth was produced and had to be disposed off at reduced rates in the markets. The kinks were made by the defective action of the carriages of some of the spinning mules carrying 600 spindles each. The fixer on one of the mule sections was careless and permitted the scroll ropes for drawing out the carriages to get worn, loose and improperly set. Consequently the carriages jumped at times, allowing the threads to go over the noses of a number of the bobbins on the steel spindles and the effect was to create kinks as shown. These kinks were carried along in the




spooling, warping and finishing of the goods, except in cases in which the kinks were broken out mechanically or by the hands who happened to notice the same. The reed splits in the looms refused to let many of the kinks pass. But enough of the kinks got through to make many bolts of kinky cloth that had to be disposed off as seconds and at a loss to the mill.

In another instance the trouble was caused by the failure of the superintendent to properly instruct the girls at the spooling and warping to tie knots. The management too often assumes that the operatives are already trained in knot tying and no steps are taken to overcome improper tying of knots in the threads until the knotty goods are complained of in the markets. In figure 6 we show the kind of knot one girl was tying. She let the free ends hang loose a full inch longer than necessary. The properly tied knot is broken off at the ends after the union is made, so as to present no more waste yarn than is shown in figure 7. In this case the management finally had an instructor go through the works and give special attention to all of the persons having anything to do with tying knots. In less than a week all of the hands were properly taught how to make knots and the knotty goods problem ceased.

It hardly seems possible that a shuttle flying out of the loom would cause a warp defect particularly in a mill where the operatives were well trained and should have known better. It seems that a shuttle happened to be thrown with considerable force from a loom and the point of it banged up against the reed of an adjoining loom, bending the splits in the reed. Consequently the goods woven by this reed were given a striped appearance due to the packing of the warp threads more tightly to one side.

A red streak was produced that continued all through the cuts of that loom until some of the goods reached the final inspection board, when an investigation was made and the defective reed located. The several cuts of cloth were put on the "seconds" list and sold at a loss. The man in charge of the department was reprimanded and the weaver fined the usual sum for making a defective place in the goods that she might have overcome by simply notifying the room boss. As soon as detected, the machinist of the department with thin nosed pliers straightened the bent reed splits and the streaking or the goods ceased at once.

## COST OF OFFICIAL COTTON GRADES REDUCED.

The Official Cotton Grades as promulgated by the Department of Agriculture in accordance with Congressional action, and first placed on sale in September, 1910, in accordance with the provision of law relating thereto, have been favorably received in every cotton producing and manufacturing section of the country. The consensus of opinion is that the committee, representing every branch of the cotton industry, which fixed upon and prepared samples of the nine Official Cotton Grades of white American cotton has done its work well.

These grades have been formally adopted as the basis of their operations by the Cotton Exchanges at the following places: New Orleans, La., Memphis, Tenn., St. Louis, Mo., Charleston, S. C., Natchez, Miss., Little Rock, Ark., Galveston, Tex., Macon, Ga., Mobile, Ala.

It is probable that other exchanges will adopt these standards. The New England Cotton Buyers' Association and the Arkwright Club have both agreed to make these grades the basis of their purchases and the Southern Cotton Buyers' Association has agreed to make them the basis of their quotations to these manufacturing associations.

The Official Cotton Grades are of interest to the following classes, all of which are represented in the list of purchasers.

Cotton warehouses, growers, mills, dealers exchanges, ginners; banks, textile schools, agricultural colleges; commercial museums, Chamber of commerce; and freight exchanges.

The grades were first placed on sale in September, 1910, at the cost of their preparation, which was then $35.00 per full set. It is now found practicable to reduce the price of the full set of nine grades to $25.00; and fractional sets of three grades each are being sold at $9.00. These fractional sets place the Official Cotton Grades within the reach of nearly everyone.

According to Consul Herbert R. Wright, of Puerto Cabello, Venezuela, it is said that a cotton syndicate will soon be established at San Carlos, in the State of Zamora. The consul states that 100 laborers are at work clearing the land, which will be devoted exclusively to tree cotton.

# NEW MACHINERY AND TRADE NOTES.

## UP TO DATE METHODS OF CLOTH HANDLING.

With the increase in the output of Southern cotton mills and a growing tendency to increase the wages of labor, machinery for handling the product becomes of more interest to mill owners. Most of the finished goods are handled in Southern mills by men and trucks, and platform elevators are used to carry men, trucks and goods from floor to floor. This process is in most cases both slow

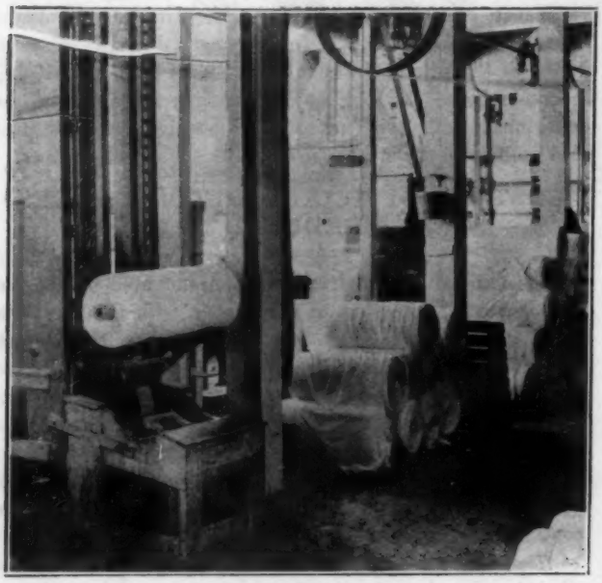


Fig. 1. Picking up the Roll at the Bottom.

and costly, and the time is coming when Southern mills must be as well equipped with labor-saving machinery for elevating and conveying goods as many New England mills

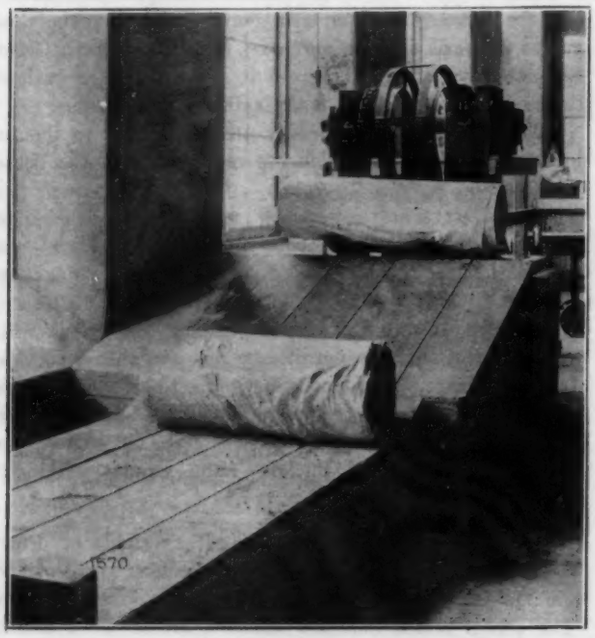


Fig. 2. Discharging From the Lifting Side.

Fig. 3. A Horizontal Conveyor.

are now. Ordinary chain elevators with curved arms are in general use for handling rolls of cloth from floor to floor, but these discharge packages at the top only by carrying them over the head wheels; an improved form which requires less floor space and which discharges at one or more points on the lifting side is shown in the illustrations.

This machine can be set close to a wall, picks up rolls or bales from a table or skid at the bottom as in Fig. 1, and

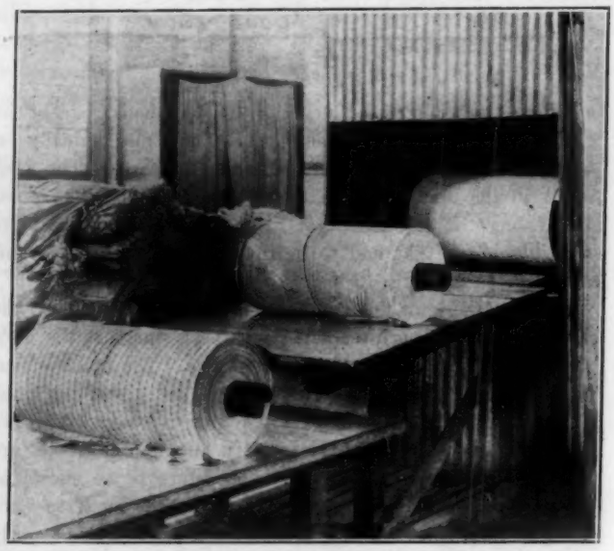


Fig. 4. Another Method of Discharging Rolls.

discharges them gently on the lifting side, as in Fig. 2, without the shock of dropping them over the head wheels. Machines of this kind have been furnished by the Link-Belt Company, of Philadelphia and Chicago, to various mills in New England to Jos. Bancroft & Sons Co., Wilmington, Del., Aberfoyle manufacturing Co., Chester, Pa., Riverside Mills, Augusta, Ga., and others. For carrying

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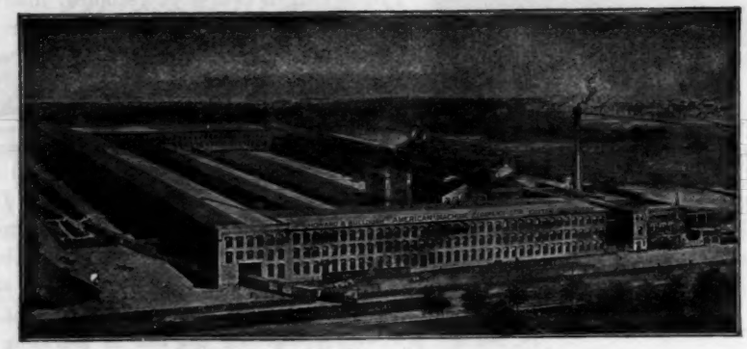

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packages, rolls and cloth, bales, etc., in a horizontal direction Fig. 3 is in general use. It is strong and cheap and serves a great variety of cases. Fig. 4 shows another method of discharging rolls from a conveyor.

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Charles H. Fish, the eminent engineer, on June 1st, opened offices at 85 Devonshire St., Boston, Mass. It will be remembered that Mr. Fish was originally connected with the United States Engineering Corps, but later gave his attention to the details of cotton manufacturing, dyeing printing, and bleaching. He was for a long time connected with the Cocheco Mfg. Co., at Dover, N. H., and later with B. B. & R. Knight, of Rhode Island and Dearing Milliken & Co., of New York. He is now taking up the various branches of engineering connected with the reorganization or mechanical improvements of manufacturing plants, including the questions of steam and electric power.

---

Bradford soluble grease is the name of a softener, prepared by THE ARABOL MFG. CO., of New York, esecially for the finishing of cotton fabrics, both colored and white. It is absolutely neutral and by its use the softness can be graded to any point desired.

---

F. D. Blackmore is the latest addition to the sales force of the UNITED STATES HOFFMAN CO., of Syracuse, N. Y. He will represent the "HOFF-MAN" in Chicago, Wisconsin and Minnesota.

## ANNOUNCEMENT.

We are pleased to announce that the BRIGGS-SHAFFNER COMPANY, of Winston-Salem, N. C., have acquired the sole right to the manufacture and sale of Hygrosso Humidifiers under the John W. Fries Patents. Also that John E. Schott, of Charlotte, N. C., who has been with Hygrosso since its introduction will be with this company in the same capacity as with Mr. Fries, and will also be in position to discuss with you your requirements for machine work.

This new addition to their business, will if anything, increase their present facilities for all kinds of machine and foundry work, such as designing and building special machinery, high grade castings in iron, brass, bronze and aluminum, and repairs and repair parts of every description. Their equipment is complete for promptly and satisfactorily repairing machinery for cotton mills, wood working plants, etc., and they invite comparison of prices, quality considered, with those charged elsewhere. All orders for Hygrosso or machine work will receive prompt, careful and personal attention.

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The Glenn Lowry Mfg. Co., of Whitmire, S. C., the Augusta Factory of Augusta, Ga., the Manchester Cotton Mills, of Manchester, Ga., and the Opelika Cotton Mills, of Opelika, Ala., have installed the Kinkead Apparatus for aligning and leveling shafting. This apparatus is manufactured by the KINKEAD MANUFACTURING CO., 7 Water St., Boston, Mass.

## A NEW FLOOR SWEEP.

The D. D. FELTON BRUSH CO., of Atlanta, Ga., are introducing a "Curved Floor Sweep" that has proven to be of great economical value to the mill trade. It is constructed on a hard wood curved block of any length to fit

the aisles and is made from a heavy tough pliable fibre. It is in reality a push broom and the shape is such that it will outwear a dozen brooms of ordinary construction. The curve of the block throws the dirt and lint to the center and prevents it from being scattered all over the room. They are being made mostly in 24, 28 and 30 inch lengths.

## BOOK REVIEWS.

THE BLUE BOOK TEXTILE DIRECTORY, 25th Anniversary Number, published by the DAVISON PUBLISHING CO., 407 Broadway, New York. Price delivered: Office Edition $4.00; Pocket Edition, $3.00; Salesmen's Edition, $3.00.

This 25th anniversary edition just issued, showing some 376 new mills and firms added to the work this year, of which a separate list is given.

The office edition covers over 1,100 pages, and the pocket edition about 950 pages, the office edition being printed on coated paper with a large page, while the pocket edition is printed on very light paper with smaller pages and flexible covers, to make the volume as light as possible for those wishing to use it on the road.

The Salesmen's edition covers 350 pages, size 3½ by 5¾, this volume being issued specially for the traveler visiting the textile mills.

The textile maps have been revised to date, these showing all towns at which textiles mills, dye print or bleach works are located.

A directory of the Fibre Mattress Makers has been added to the volume this year, owing to the close connection between that line and the textile industry.

The Blue Book contains accurate, full and revised reports of all Textile Manufacturers in the United States and Canada including in the office edition a Classified Directory of the Cotton and Woolen Mills and a Directory of Textile Mill Supplies, covering the Machinery, Chemical and Dye-Stuff Manufacturers, with Commission Merchants, Yarn Dealers, Cotton, Wool, Waste and Hair Dealers, etc., and these with thumb indexers for quick reference and its many pages of specially engraved maps, make it a trade work of the highest order.

TAPPET & DOBBY LOOMS. Their Mechanism and Management. By Thomas Roberts, head of the weaving and designing department of Holmfirth & Dewsberry Technical Institute, and formerly lecturer in the textile department of the Huddersfield Technical College. 220 pages. 65 illustrations. Price 3/6 net. Published by Emmott & Co., Ltd., 65 King St., Manchester, England.

This volume is another of the Textile Manufacturer Manuals and the greater portion of the work originally appeared in the Textile Manufacturer of Manchester, England. Mr. Roberts treats the subject fully and shows a familiarity with the details that could only be obtained by many years of practical exerience and observation. The book also contains many detailed descriptions of the motions which were expressly noted for the sake of students following a course of technical instruction, thereby filling a long felt want in that particular direction. The book will create a great deal of interest among all students of this type of machinery.

Under the heading "An Old Friend With a New Face," *Cotton Chats* for June discribes and illustrates the improved banding machine made by the DRAPER COMPANY of Hopedale, Mass. It says that this machine which includes all the good features of the Week's banding machine which was introduced nearly forty years ago, adds the Watters' marking attachment, Rhodes' patent improvement to prevent spattering the ink in marking, and Rhoades' patent arrangement for making bands with reverse twist.

The machine is built with iron frame; has an automatic brake; has marking attachment to mark the bands at a uniform length to indicate where they are to be tied; the band hook slide has a graduated scale so that the bands may be made to a predetermined length. By changing the position of the belt shipper, bands can readily be made with reverse twist. The machine is easily operated by inexpensive help and in many mills fills the requirements better than more expensive machines. A good stock is carried both in Hopedale and Atlanta and orders always receive prompt attention.

## A COTTON WASTE MACHINE.

The reclamation of cotton waste is demanding and receiving increased attention from manufacturers and is bound to be more and more a factor in profitable manufacturing. Therefore, machinery that will clean and improve the condition of waste will receive the attention of almost every manufacturer. The theory that not enough attention is being paid to the preliminary processes in cotton goods manufacture is generally accepted to-day and the progressive manufacturer is taking steps to rectify this lack of attention.

A new machine known as the Shaughnessy cotton waste reclaiming machine, built by the SMITH & FURBUSH MACHINE CO., of Philadelphia, is being introduced to the cotton manufacturing industry, and according to the claims of its builders has much to warrant careful examination and trial. It is truthfully said in an announcement of the builders that the resultant product after passing through the machine can only be appreciated by those who have seen samples before and after undergoing the process. At the same time, however, the statement of the results accomplished should be of interest to those who are seriously considering the improvement of their processes.

As a general proposition it can be stated that the Shaughnessy machine removes foreign matter from the

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The Barrett Specification embodies the best experience of the roofing industry and is designed for the benefit of architects, engineers and owners.

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waste and delivers clean cotton in excellent condition, well opened, without injuring or shortening the original fiber. On stock that contains an unusual amount of dirt the machine is used after a willow has been employed to remove the heavier and more easily extracted dirt.

In operation the stock is thrown into the hopper of the self-feed and is delivered by it in uniform quantity to the feed table of the first section of the reclaiming machine. It passes from the feed table through metallic-toothed feed rolls to the main cylinder, which carries the stock down and past, first, a specially constructed cleaner roll, which removes and drops the larger pieces of foreign matter; then to a series of toothed under-workers, which open the stock and separate from the fibre and drop more of the dirt and particles; then past a small special beater, which removes or beats out more foreign particles, after which the cotton is removed from this main cylinder by a brush, which delivers the stock to a double screen condenser and suction cleaner; this in turn delivers the stock in the form of a soft lap to the feed rolls of the second section. The second section handles the stock in a similar manner to the first section, but is finer clothed, and is adapted to separate, remove and drop smaller particles than the first section.

The stock in soft lap form is continuously received from the condenser of the second section by a triple blade beater or finishing section, which in turn, throws the stock into a stock room; or an overhead condenser may be used to receive the stock, remove the air and dust therefrom and drop the stock into a bin or baling press. Each condenser on the machine is provided with a suction fan that removes the air delivered along with the stock by the brush before the stock is fed to the next section of the machine. The outlets of these fans should be connected with sheet-iron pipes, to carry the waste air and dust out of the room.

The 35 years experience of the Smith & Furbush Machine Co., in building garnett machines is a sufficient guarantee of the first class construction and durability of the new machine, which although so different in construction that it cannot be compered with other cleaning machines, yet involves parts which have long been used in the construction of other well-known machinery.

The capacity varies according to the kind of stock handled, and when properly operated the average output in finished product per day of ten hours is about as follows:

1200 pounds of finished stock from willowed cotton mill motes; this stock loses about 40 to 50 per cent of weight in passing through the machine;

1200 pounds of finished stock from willowed gin motes; this stock loses about 40 to 50 per cent of weight in passing through the machine;

3000 pounds of finished stock from wets and drys from the cotton bale; this stock loses about 5 per cent in cleaning;

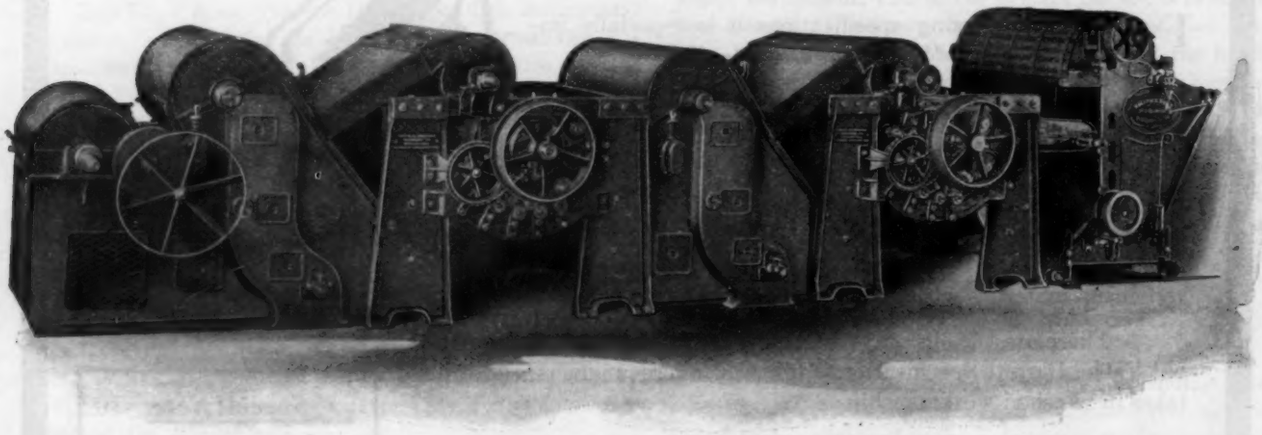
3000 pounds of finished stock from factors' or cotton brokers' samples; this stock loses about 2 per cent in cleaning;

3000 pounds of finished stock from warehouse and compress sweepings; this stock loses about 5 per cent in cleaning;

3000 pounds of finished stock from gin flues or cotton that lodges and collects in the pipes; this stock loses about 5 per cent in cleaning;

2000 pounds of finished tock from grabbots or immature cotton that the gin discharges and is afterwards gathered in the ginnery sweepings; this stock loses about 15 per cent in cleaning;

3000 pounds of finished stock from thrash cotton containing leaf or boll shells, or from any kind of dirty, seedy or damaged cotton that is free from jute or other hard twisted strings; this stock loses about 10 to 15 per cent in cleaning.

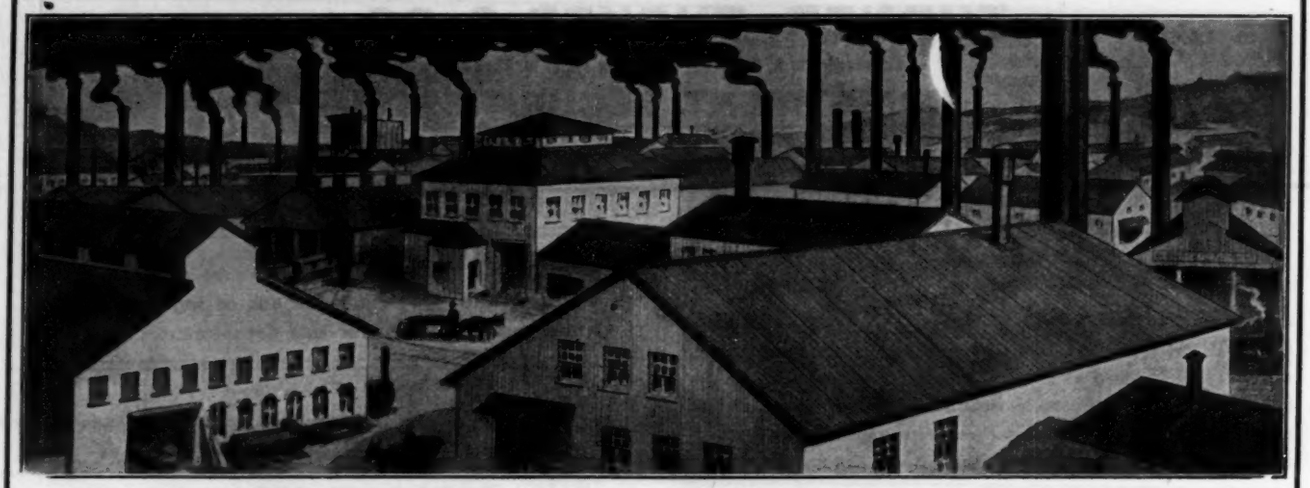


SHAUGHNESSY COTTON WASTE RECLAIMING MACHINE.

The above estimates were furnished by the builders.

Any manufacturer who uses waste containing fiber which can be reclaimed should be interested in the operation of this machine, further particulars of which will be sent upon request. The company also makes a single section reclaiming machine which is the same as the double machine above described without a condenser and the beater section. While the capacity is the same as in the double section machine the cleaning is not as thorough, though answering the purpose of stock that does not require so much cleaning.

John W. Shaughnessy, of Charlotte, N. C., formerly of Cohoes, N. Y. the inventor of this machine has had long experience in handling both high and low grade wool and cotton stock as well as experience in manufacturing machinery and the machine is the result of a number of years of experimental work.



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MANUFACTURING CO. SHARES. MILL STOCKS. 24 Milk St., Boston. 111 Broadway, New York.

## IMPROVED SULPHUR BLACK.

The sulphide of soda used to keep sulphur black in solution has an injurious action on cotton. SCHOLLER BROS. Co., 3301 Amber St. Philadelphia, Pa., have overcome this difficulty in the use of their Improved Brilliantone. Used in the dyebath, it gives a beautiful, bloomy, jet black shade, causes the goods to retain their natural handle and imparts a superb, lustrous finish.

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PROTECTION WHICH PROTECTS is the title of a speech made by U. S. Senator W. B. Heyburn, of Idaho, May 25, 1912. This speech has been issued in document form by the American Protective Tariff League as document No. 4. Send postal card request for free copy to W. F. Wakeman, Sec. 339 Broadway, New York.

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It is the desire of every cotton manufacturer, particularly if his mill be located in a small town or in the country districts, to have in connection therewith a model mill village. Many things go toward making a model mill village. One of the principal things however is to have the houses roofed so successfully that accidental fires are reduced to a minimum and roof leakage is a thing unknown. These features were brought strongly to mind a short time ago by noticing a mill village where practically every house in the whole village was securely and satisfactorily covered with Cortright metal shingles. When looking for a permanent and profitable investment for your mill village and one that will begin earning dividends as soon as the work of laying commences, remember the Cortright metal shingle. A little inquiry into this subject is well worth while even in vacation time. Just address a post card to the CORTRIGHT METAL ROOFING CO., 50 North 23rd St., Philadelphia, Pa., and tell them you are from Missouri. They will do the rest.

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For over fifty years the DRAPER COMPANY and its predecessors have sold shuttle guards. The George Draper and Son catalogue of 1871 says: "For eleven years we have sold shuttle guards among manufacturers. The guards have doubtless saved hundreds of weavers from personal injury besides preventing damage to warps, reeds, temples, etc., to an amount far exceeding their cost."

And yet the manufacturers recently learned of a mill where within a period of two weeks shuttles flying out have caused three serious accidents, each calling for the service of a doctor. On Northrop looms Sullivan shuttle guards are included as a part of the equipment.

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The Farbenfabriken of Elberfeld Co., 117 Hudson St., New York City, are sending to the trade the following descriptive color cards and samples; Plutoform Black 3 G. L; Katigen Indigo 3 G T Extra Conc.; Diazo Brown 6 G; Benzo Fast Blue 2 G. L; and Benzo Brown C. B.

## MILL NEWS.

**Notices of mill projects, additions or improvements are solicited for this department.**

### ALABAMA.

MONTGOMERY. The Montala Mfg. Co. of this place have recently placed an order for a C. O. B. machine.

### CONNECTICUT.

NORWALK. The Danielson Co. of this place is to replace 1500 of their old looms by new looms in their mills here.

KILLINGLY. The Danielson Cotton Co. has been incorporated under the laws of Massachusetts for the purpose of engaging in the manufacture of cotton and other textiles. The company's plant will be located at Killingly with the principal office in Boston. Capital stock in the new corporation is 775,000.

WILLIMANTIC. Work has been started on a three story addition to the Conantville Mill which is operated by Max Pollack & Co.

### GEORGIA.

GRIFFIN. The officers of the Rushton Mills of this place have been changed from their past quarters between the Savings Bank and the Griffin Banking Co. on Hill street to the upstairs room of the Kincaid Block on East Soloman street.

MACON. The city council has taken favorable action for the building of a bonded warehouse in this city to cover sixteen acres, which will have six compartments to hold one thousand bales each. This means, it is reported, an annual local disbursement of $12,000,000 more than heretofore. The council will provide the ground which will be near the city stockade.

PALMETTO. The Palmetto Cotton Mills are to increase their carding capacity and have placed an order for revolving flat cards with the Howard & Bullough American Machine Co., Pawtucket, R. I.

DOUGLASVILLE. Twenty new Draper looms are being placed in the Lois Cotton Mills of this place. A new addition has also been made to the main building.

EATONTON. The Imperial Mills of this place intend adding more new machinery and it is reported that some other improvements are also on foot.

### MAINE.

CORRINNA. The Corrinna Mfg. Co., which was incorporated last May with a capital of $50,000, has started to work on its new plant. The main mill building will be 120 x 52 feet.

### MASSACHUSETTS.

LOWELL. It is reported that the Lowell Bleachery has leased a building with 55,000 square feet of space on one floor at St. Louis and will install equipment for bleaching tertiles.

MALDEN. The Yale Knitting Co. is to erect a new storehouse on their recently acquired property. The structure will cost approximately $6,500.

NORTH ADAMS. It is locally reported that the Windsor Print Works is planning to enlarge its plant either by the erection of a new building or leasing some other building.

FALL RIVER. At a special meeting of stockholders of the Crystal Springs Bleaching & Dyeing Company of Assonet, Mass., officers were elected to effect a new organization in conformity with the change in controlling ownership. The following officers were elected Treasurer and manager, John Thwaites† directors, E. C. Bataille of the American National Bank, Newark, N. J.; T. S. Cahill, New York; John Thwaites, Dighton, Mass., and Albert A. Harrison, Fall River. The directors subsequently elected Mr. Harrison president. Mr. Thwaites is the purchaser of the controlling interest of stock held by William Fish, Jr., of New York. Mr. Fish was president and director and Albert L. Frost of New York was treasurer and director. Both retire. Robert B. Carter of New York and William N. McLane of Fall River retired from the board of directors some time before Mr. Fish sold his interest. Only Jonathan T. Lincoln of the former board is continued a member. Frederick D. Bowker continues as corporation clerk.

## *ARE YOU USING "AMERICAN ANILINE COLORS"?*

**If not, you had better send us an inquiry. It will be of benefit to you. We manufacture a full line of Aniline Colors for Textiles.**

**SCHOELLKOPF, HARTFORD & HANNA COMPANY, Buffalo, N. Y.**

Selling Agents:—NATIONAL ANILINE & CHEMICAL CO.

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| New York | Boston | Philadelphia | Chicago |
| Milwaukee | Minneapolis | Cincinnati | Buffalo |
| Kansas City | Hartford | Providence | |

# ANTIMONY LACTATE.

¶ As has been widely noted there has been a very sharp advance in the price of Antimony Oxide. Without dilating on the cause of this advance it is of especial importance to users of Antimony products as mordants because they too, will doubtless advance. In the average Antimony product used for mordanting only a comparatively small percentage of the Antimony Oxide it contains is available, the rest is lost, because of the excessive acidity of the bath.

¶ All the Antimony Oxide in ANTIMONY LACTATE is available, hence it is particularly the mordant to use with an advancing Antimony Oxide market.

**AVERY CHEMICAL CO., 88 Broad St., BOSTON.**


### NEW HAMPSHIRE.

TILTON. G. A. Tilton & Sons, hosiery manufacturers, with headquarters at Tilton, and with branch mills at Laconia, N. H., and Savannah and Augusta, Ga., have leased the third and fourth floors of the Wheelock property in Lowell, Mass., which will be equipped for the manufacture of regular lines of ladies' and children's hose. The expansion of business of this firm makes necessary this increased capacity.

### NORTH CAROLINA.

BURLINGTON. It is reported that W. J. Thompson will establish a hosiery mill at this place and has secured suitable buildings for the purpose. Contract for the machinery, it is understood, has already been awarded.

CHARLOTTE. The contract for the mill building of the Thayer Mfg. Co. of this place has been awarded to the Fiske-Carter Construction Co. of Greenville. These buildings will include weave sheds, carding and spinning mills, warehouse, boilerhouse, pump house, reservoir and stack.

CHARLOTTE. E. Z. Finlayson, Treas. of the E. Z. Finlayson Mfg. Co. of Charlotte, is making arrangement to establish a new company which will be known as the American Overall Co. and will manufacture men's overalls, work shirts and automobile suits. This company will commence business with a capital of $25,000. A new factory building is to be erected with four floors. Two of these floors will be used for the E. Z. Finlayson Mfg. Co. for making men's pants, and the other two floors by the American Overall Co. Both companies will be under the same management and the same selling force will dispose of the products.

HICKORY. It is reported that a new mill is to be built in Hickory by the Ivery Mill Co.

LEXINGTON. The Dacotah Mills of this place are installing some additional machinery. This consists of four new spinning frames and eight deliveries of drawing. It is understood that contract for it has already been placed.

SHELBY. The new building for the Ella Mfg. Co. which was previously announced is to be for the purpose of a weave shed, one story high, having a capacity of 240 looms, and also for a cloth room.

GASTONIA. That a new cotton mill is to be built in Gastonia was definitely determined sometime ago at a meeting of the promoters. The Armstrong Cotton Mills Co. will be the name of the company which was promoted by Colonel C. B. Armstrong, one of the best known mill men of the state. The authorized capital of the mill will be $200,000. A charter has been applied for and steps will be taken immediately to begin the erection of the building. This makes seventeen mills for Gastonia and sixty-three for Gaston county.

### PENNSYLVANIA.

PHILADELPHIA. Notification has been made by Henry M. Schadewald that as his five years as trustee of the estate known as Schadewald Mills expired May 19, 1912. The business will be continued by Henry M. Schadewald and William F. Schadewald under the firm's old name, The Schadewald Mills. These mills manufacture bed spreads and hair cloth.

WERNERSVILLE. The Wernersville Hosiery Mill is erecting a new mill and dye house. The main mill building will be two stories high with basement and will be of brick construction. This work is expected to be completed around August first.

### SOUTH CAROLINA.

PICKENS. The Pickens Mills have paid their usual 3 per cent. semi-annual dividend and now expect to add 6,000 spindles to their equipment without increasing the capital stock.

GREENWOOD. Greenwood Cotton Mills are to install a new boiler at their plant. Contract has been placed with the Lombard Iron Works of Augusta ,Ga.

UNION. The Union Buffalo Mills of this place have recently made improvements to their power plant in the form of a high pressure boiler manufactured by the Lombard Iron Works of Augusta, Ga.

GREENVILLE. The new Westervelt Mills of this place has started and have now in operation about three hundred looms.

EASLEY. The Glenwood Cotton Mills have increased their capital stock to the amount of $400,000. This increase is to enable the company to pay for its additional buildings and machinery which was announced sometime ago.

### TEXAS.

McKINNEY. The Texas Cotton Mills Co. will increase its capital stock $30,000. It is understood that the additional investment will be expended for additions and extensions.

# Weighténing Softner

A SOLUBLE GUM to be used in either Sizing or Finishing. It is especially valuable in the finishing of cotton fabric, when used together with Bradford Soluble Grease. By using these two articles any desired finish may be had, when used in the proper proportions. Weightening Softner is also an excellent binder for weightening materials. Manufacturers of tickings use it extensively for this purpose in conjunction with China Clay. It does not gum the pins. Write for finishing recipe.

**ARABOL MFG. CO.**

**100 William Street** **NEW YORK**

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*CAMERON MacRAE* *CHARLOTTE. N. C.*


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